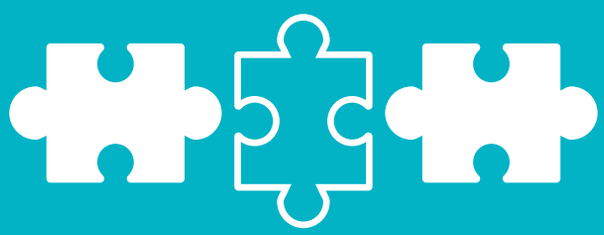
Abstract

The primary objective of this thesis is to explore and design the implementation strategy for Leefmaatje, a self-management chatbot for type 1 diabetes (T1D), by developing a business case focused on value proposition, key stakeholders identification, and the key activities and resources required to ensure long-term sustainability of the service. Using strategic design approaches, the project aims to enhance the efficiency of future T1D patient care at Radboudumc. This is achieved by mapping the care journey, identifying stakeholders and their value exchanges, and creating an implementation concept that improves, rather than adds complexity to, the existing T1D care system.

Reimagining Type 1 Diabetes Care

Chatbots, Value & Integration



Master thesis

Strategic Product Design

By Kalyani Chopade

TU Delft

Radboudumc

university medical center

Author

Kalyani Chopade

Master thesis

MSc. Strategic Product Design
Faculty of Industrial Design Engineering
Delft University of Technology

Graduation committee

Chair | **Prof. GW Kortuem**
Faculty of Industrial Design – Internet of Things

Mentor | **Asst Prof. Dr. V.P. Pannunzio**
Faculty of Industrial Design – Design, Organization & Strategy

Company mentor | **Barend Heeren**
Business Innovator - Health Innovation Labs at RadboudUMC

August 2025

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“Empowerment of individuals & communities is absolutely central. Getting the community involved in organizing their own destiny has got to be a key part of it.”

Michael Marmot | Author, The Health Gap

“From the written word to sailing vessels, technology increases interconnectedness, helping to boost its own flow and spread. Each wave hence lays the groundwork for successive waves.”

Mustafa Suleyman | Author, The Coming Wave

Acknowledgments

Thank you! with Gratitude

Over the course of this thesis, I found myself in the company of remarkably generous minds and kind souls who sparked my curiosity, challenged my assumptions, and helped me unravel the complexities of Healthcare, Type 1 diabetes, chatbots, philosophy, service design, and implementation in the real world. I am endlessly grateful to each of you for nudging this project forward, sometimes subtly, sometimes pushing-ly, but always meaningfully.

To my supervisory team: Gerd, thank you for your ability to distill complexity into clarity, and for always reminding me to zoom out when I was too tangled. Valeria, your optimism and unwavering encouragement were often the much-needed light during the times of crisis. I couldn't have wished for a better compass than the two of you. Thank you for having faith in me it was empowering.

To Barend and Milou, thank you for pulling me deeper into the rich, multifaceted world of Type 1 diabetes and for introducing me to voices I might not have otherwise heard. Your time, insights, and patience were invaluable. And to the wonderful team at the Health Innovation Labs: Leanne, Martijn, Monique, Yvonne, and Leonie, thank you for welcoming me so warmly and for letting me feel at home even when everything around me was new.

I'm deeply thankful to Valentijn, Deborah, and Eric, whose expertise anchored this thesis in real-world depth, and whose quiet confidence helped me find my own. Dirk, your visual thinking helped me give shape and structure to complexity of patient journeys, thank you for that clarity.

To Bart, Jiwon, and Senthil, our conversations, spontaneous as they sometimes were, lingered and grew, subtly informing the way I thought about key ideas. And to everyone at TU Delft who shaped my last two years into something more than just academic: you belong in this story too.

To all the enthusiastic interviewees, thank you for generously sharing your experiences and insights. Your voices brought this thesis to life and gave it texture.

And to the brilliant constellation of people who helped me in small ways, large ways, and all the messy in-betweens, I'd like to name a few in alphabetical order: Akash (my brother), Alessandra, Chiara, Himanshu, Meike, Prathamesh, Rajvi, Rohan, Shreyasi, and Xueheng. You were the supporting cast in all the best ways.

Finally, to Aaii (my Mom) and Babaa (my Dad) — for everything, always.

Preface

Why This Why Now?

This thesis is an exploration of ideas, technologies, systems, and the quiet but critical gap between innovation and implementation in healthcare. It asks how advanced technologies and data-driven services might be positioned to create lasting value not just for end users, but for the healthcare providers and systems that sustain them.

As a young designer, I've often found myself intrigued by the many brilliant ideas that never quite leave the whiteboard. In healthcare especially, there's no shortage of vision. But somewhere between concept and execution, things get lost. This thesis is my attempt to understand that space to make sense of the missing links that so often stand in the way of progress.

Choosing a Master's in Strategic Design wasn't an accident. It was a deliberate step toward learning how to bridge those gaps meaningfully between big ideas and everyday systems, ambition and feasibility. Healthcare is complex, often slow to change, and yet deeply in need of thoughtful transformation. It's in this space challenging, essential, imperfect — that I want to contribute.

Six months ago, I began this project with a promise to myself: to learn by doing. At the intersection of healthcare, AI, and business, three evolving, intersecting worlds, two of which rarely sit still, I found a rich and demanding terrain. With the skills I've developed during my master's, I took on this challenge, navigating it with equal parts curiosity, and caution. Along the way, I've come to see healthcare as an ecosystem, AI as a service, and strategy design as something closer to jazz than chess: improvised, iterative, and deeply human.

What you'll read in the pages ahead is the product of many loops of exploration, refinement, and reflection. I've come to understand that strategy design is rarely linear. It asks for patience, resilience, and a certain kind of optimism — the kind that believes good ideas, when nurtured well, can become real things in the real world.

This project is inspired by practitioners and intended for them — the ones who carry the weight of change on their shoulders, who work toward long-term value when the world often rewards short-term wins, who try anyway. This is for you.

Reading Guide

The reading guide exhibits the overview of the report to assist the reader towards the desired text. On the next page you can see overview of the project and short description per chapter which discloses it's content.

At the start of each chapter is a short introduction of conducted research and methods / frameworks used. At the end of main section is an overview of the key insights on a purple box. These represent the rationale for the final design and in the recommendations for Health Innovation Labs.

If you are interested but have no time to read the most important insights are summarized or visualized on top of the dark purple background at the end of each chapter.

Stakeholder names and the names of studies' participants are anonymized to maintain privacy.

Text

Bold Text

Bold text indicates concluding insights

Italic Text - *Italic Text*

Italic text refers to quotations

Insights, Decisions & Conclusions

Text and visuals on the dark blue background contain the most crucial insights for the design and recommendations

Examples, Illustrative Quotes & Stories

Illustrative examples and quotes for a deeper understanding are written or visualized on the light pink background.

Define

Research

Synthesis

Design

Test

Table Of Content

Abbreviations

A1C	Hemoglobin A1C
BMC	Business Model Canvas
CGM	Continuous Glucose Monitoring
DDD	Data-Driven Digital care (context-specific)
DVN	Diabetesvereniging Nederland (Dutch Diabetes Association)
ER	Emergency Room
EHR	Electronic Health Records
FGCM	Flash Glucose Continuous Monitoring
HCP	Healthcare Professional
HIL	Health Innovation Labs
IZA	Integraal Zorgakkoord (Integral Healthcare Agreement)
NLP	Natural Language Processing
NVD	Nederlandse Vereniging van Diëtisten (Dutch Association of Dietitians)
Radboudumc	Radboud University Medical Center
RT CGM	Real-Time Continuous Glucose Monitoring
T1D	Type 1 Diabetes

Chapter 01 | Hello There!

Project Context & Approach

In this chapter

Background Image | *Creative Facilitation Workshop 1 in Wekerom, me explaining the context*

This chapter provides an overview of the project context. It sets the objective and the relevance of this thesis and introduces the intersection of the three domains addressed, namely healthcare, AI and Business. Additionally, it shares the design and research approach tailored and used in this work.

Background Image | *Creative Facilitation Workshop 2 in Wekerom, me explaining the context*

Diabetes doesn't take a day off, and neither do I.

Needles - by Andie Dominick

1.1

Project aim & approach

1.2.1 Project aim

The primary objective of this thesis is to explore and design the implementation strategy for **Leefmaatje, a self-management, information provision, personalised chatbot for type 1 diabetes (T1D)**, by developing a business case focused on value proposition, stakeholder identification, and the key activities and resources required to ensure long-term sustainability. Using strategic design approaches, the project aims to enhance the efficiency of future T1D patient care at Radboudumc. This is achieved by mapping the care journey, identifying stakeholders and their value exchanges, and creating an implementation plan that improves, rather than adds complexity to, the existing T1D care system.

The arguement to put forth by this thesis is that if Radboudumc's HCP's and T1D patients are supported by such a service that fill in gaps in between appointments explicitly and there by improving care delivery and work efficiency, the outcomes would be more satisfying for involved users and at large Radboudumc.

This has been proposed and preliminarily tested by development of "Integrated concept" of Leefmaatje which goes beyond just tailored information provision to T1D patients.

1.2.2 Design Questions

Currently there are unknowns with respect to placement, value proposition and who needs to be involved in implementation of the service to make the service sustainable. Hence the main question and respective sub-questions are as follows:

1. **How might we position Leefmaatje so that it creates meaningful long-term value for all stakeholders?**

This question was intentionally formulated to remain open and exploratory, broad enough to accommodate the evolving nature of the project and the complexity of healthcare innovation.

To explore this overarching question, it was broken down into three focused sub-questions:

1. 1 Positioning:
Where to introduce Leefmaatje in the care journey?

1. 2 Stakeholders:
Who are the key stakeholders that must be identified and involved for the successful implementation of Leefmaatje?

1. 3 Viability:
How to design a compelling value proposition for Leefmaatje that ensures a viable and sustainable business?

1.2.3 Project scope

There are several factors that play a role in determining the scope of the project:

01 Radboudumc

This thesis is written in collaboration with Radboudumc, Health Innovation Labs. The Leefmaatje service with accompanying business case is designed with Radboudumc as a context.

02 Type 1 Diabetes

Type 1 Diabetes (T1D) serves as the overarching context for which the service is designed. The patient journey is mapped in detail, including both in-patient and out-patient care ecosystems, to identify potential implementation scenarios.

A broad range of stakeholders was initially identified; however, due to project timeline constraints, only a select few were chosen for deeper exploration of feasible opportunities.

03 AI Service | Chatbot

In this thesis AI Service in the form of chatbot is being proposed as a pre-given context. For the aim of this thesis only it's foundations were explored. Thereafter is focused on implementation and business case for such service. Important to mention that other technical feasibility challenges might overlap on certain areas, however they are not the focus of this thesis.

1.2.4 Target Group | T1D patients

In this project ways are explored and designed to support the T1D patients. The T1D patients in this project often consists of minors below 18 years of age and adults. Often the patients consist of newly diagnosed, experienced patients, next of kin aka family members.

1.2.5 Involved stakeholders

Next to the TU Delft supervisory team and the company mentor at Radboudumc HIL, additional parties were involved. Healthcare practitioners at RadboudUMC from T1D division, patient advocacy group - DVN and technical staff at Radboud informed the design research and validated the business case. Additionally, experts in the field of healthcare and philosophy of Ai driven services fueled the business case knowledge of this project.

Design Challenge

Design business case for Leefmaatje for its sustainable and value aligned implementation

1.2.6 Strategic design approach

In the broadest sense, the process can be divided into 2 research phases, one design phase and a validation phase. This approach is used in order to gather insights and structure it into 2 sets of outputs: Patient Journey Map & Leefmaatje Business Model for the integrated concept. In the phases specific design activities, based on the challenge and goal were chosen (figure 1.4).

Preliminary Research

The goal of this phase was to develop a foundational understanding of the context surrounding T1D care, the current state of the Leefmaatje service, and to prepare for in depth user and stakeholder research. Alongside It covers key definitions and characteristics of T1D, identifies the various stakeholders involved, and explores the future direction of care. Additionally, it examines the capabilities and requirements for developing a chatbot, including different approaches and critical success factors.

Stakeholder & User Research

The goal of this phase was to deep dive into end users of the service and stakeholders to understand pain points, priorities in the current care and what would be their expectations from such service depending on where it is placed within the care journey or outside etc. Finally, it looks closely at how patients currently interact with the existing Leefmaatje prototype, through direct observation of the introduction day conducted at RadboudUMC.

Patient Journey Map

A combination of insights from the literature review on T1D care journeys, five pre-existing interview data shared by HIL prior to the project, and two additional interviews I conducted were analyzed and synthesized into a patient journey map. As the understanding of the system deepened, this map evolved to incorporate both information flow and patient journey dynamics.

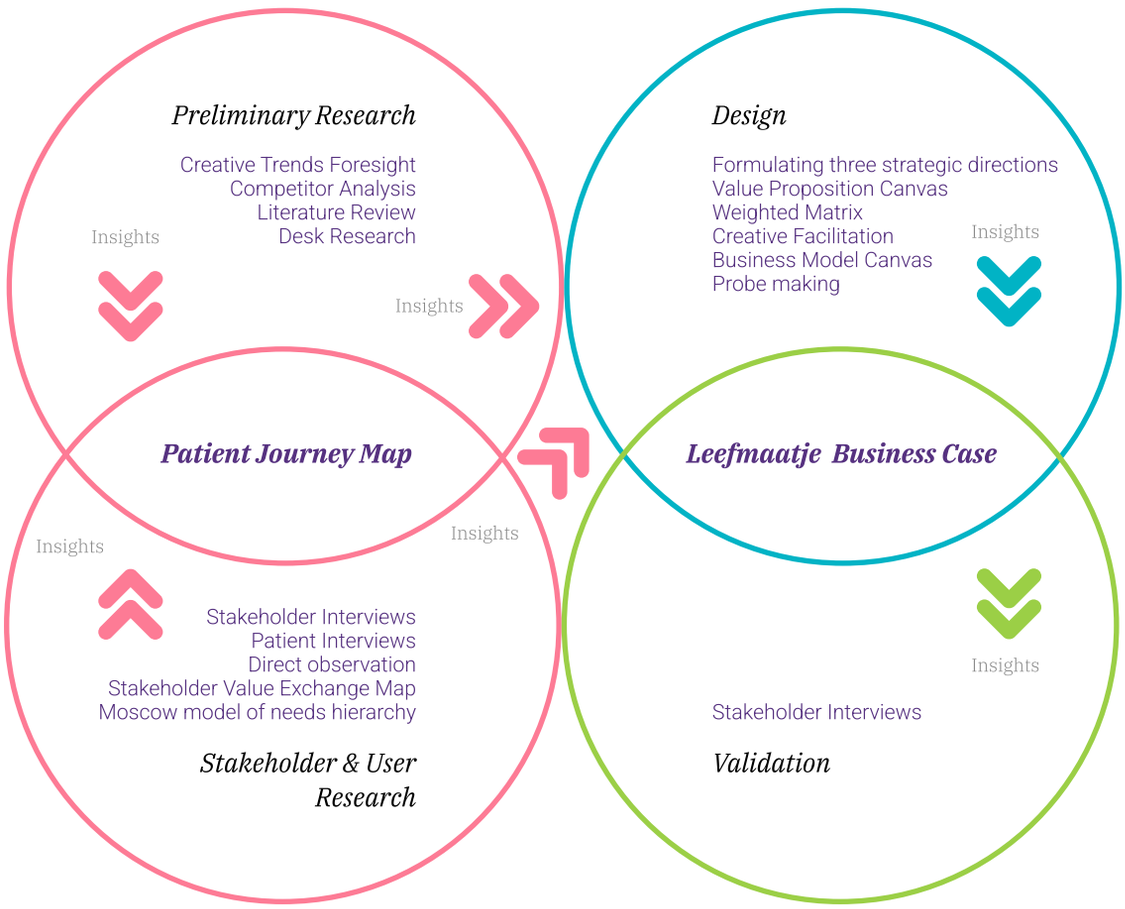


Figure 1.4: Project approach and set-up

Design

The goal of this phase was to define a clear strategic direction for the service. This was achieved by synthesizing insights from the value exchange map, stakeholder analysis, and patient journey map. Using the Value Proposition Canvas, three initial strategic directions were conceptualized. These were then evaluated against ten criteria derived from end-user interviews using a weighted matrix. Based on this evaluation, one strategic direction was selected and further developed in detail using the Business Model Canvas.

Leefmaatje Business Case

The business case was further grounded through the Business Model Canvas, with a strong focus on the value proposition, key stakeholders, essential activities, and resources required for service implementation. To make the concept more tangible, provocative prototypes ("provo-types") were developed and used during interviews to help stakeholders envision the idea and its potential impact on current hospital practices. Finally, a pitch was crafted to present the concept to various stakeholders, supported by a semi-structured interview script designed to evaluate the value proposition, key roles, and resource needs from the perspective of each stakeholder group.

Validation

The goal of this phase was to test and validate the proposed value proposition, key roles, and activities through interviews with key stakeholders. A total of five stakeholder interviews were conducted to evaluate and refine the business case.

1.2.7 At the intersection of three domains

Theoretical background of three main domains is gathered in the course of this thesis with the strategic lens. The fields of healthcare (T1D, Ecosystem & value exchanges), AI (chatbot as a service) and Business (Service implementation & Viability). This leads to an extensive literature study presented in chapters 2,3.

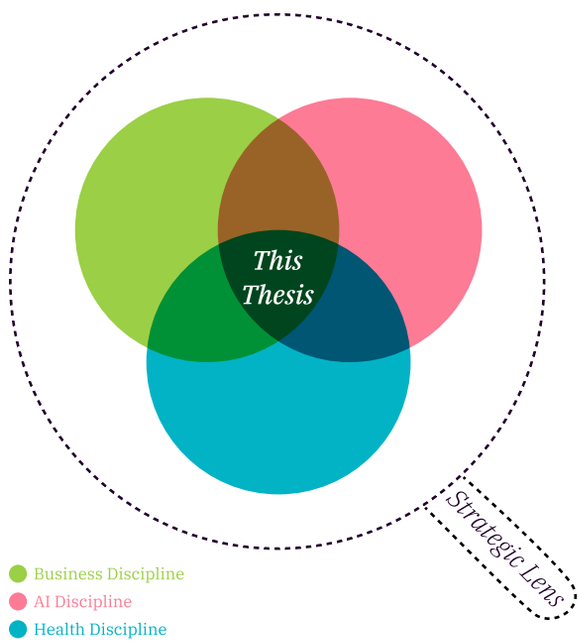


Figure 1.5: Visualization intersection of the main disciplines touched upon in this thesis.

Supervisory team who were constantly involved:

Gerd Korteum, Valeria Pannunzio, Barend Heeren & Milou Arts Tenhagen

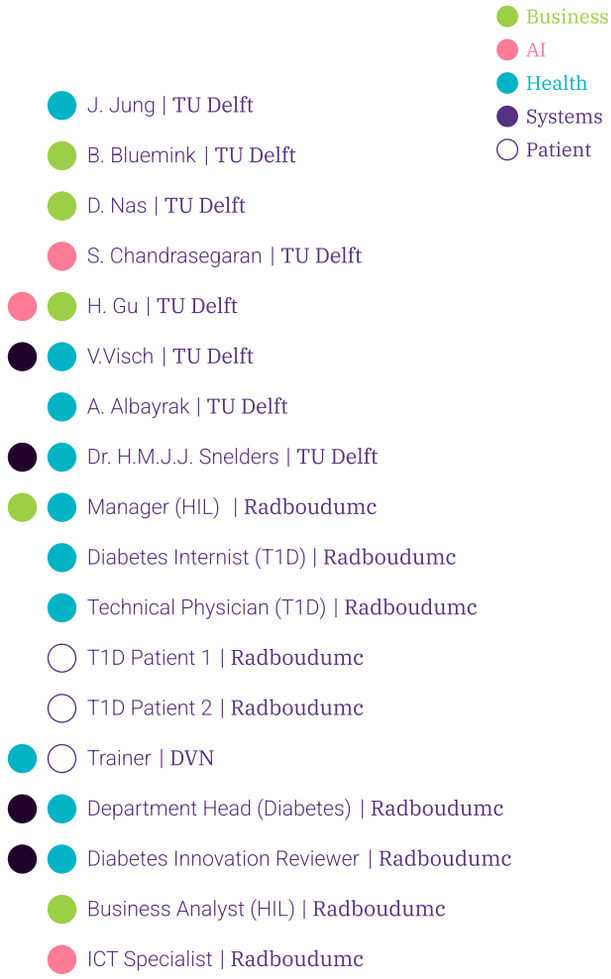


Figure 1.6: Visualization of all the interviews held during the course of this thesis

1.2.8 Interviews - experts, users and stakeholders

(AI) Chatbots and Healthcare are enormous fields to grasp. Therefore, expert interviews are conducted in this thesis as means of information retrieval. Along with different stakeholder interviews were also conducted to understand and eventually validate the business case. Figure 1.6 represents the overview of the expert interviews held during the course of this thesis.

- Research Phase (13 interviews)
- Design Phase (1 interviews)
- Validation Phase (5 interviews)

The appendix shares a more detailed overview, also concerning the informative events and presentations given.

Figure 1.6. represents compilation of all the interviews. Semi-structured interviews held in the design research are described in chapter 3. Chapter 7 shares the interviews for validation of the design.

1.2

Project context & Radboudumc

Unlike many medical conditions that may flare and recede, Type 1 diabetes demands uninterrupted, daily management. There are no weekends, vacations, or mental breaks from the disease. This chapter provides an overview of the project context and the chosen approach for the thesis founded.

1.1.1 Type 1 Diabetes (T1D)

Type 1 diabetes is a complex chronic autoimmune disease that typically develops in childhood or early adulthood. It is characterized by the progressive destruction of insulin-producing beta cells in the pancreas, resulting in the lifelong need for exogenous insulin treatment, with no curative treatment options yet (Polhuis et al., 2022; Stevens et al., 2022). The number of chronic T1D patients is also increasing annually. 4% per year (Figure 1.1). Currently 100000 of which 7000 are minors & Aging population. (Appropriate Care | National Health Care Institute, 2024b)

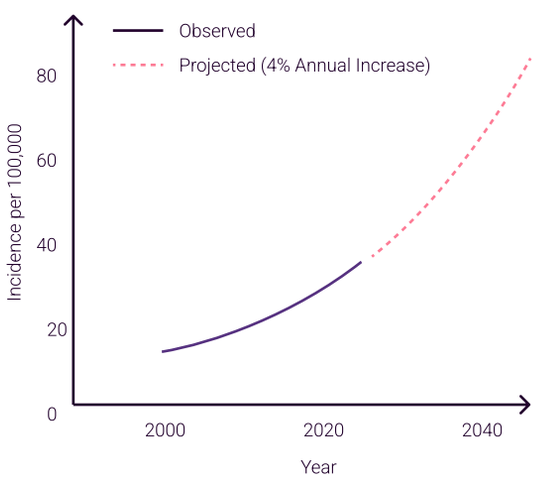


Figure 1.1: Growth in T1D Patients over the years in Netherlands forecast

Glucose & Insulin in T1D

Insulin plays a critical role in regulating blood glucose levels. Without it, glucose, the body's primary energy source, cannot enter cells to be used for energy. As a result, glucose accumulates in the bloodstream, leading to hyperglycemia. The kidneys attempt to excrete excess glucose through urine, which can result in frequent urination, dehydration, fatigue, and other complications.

Importantly, T1D can affect anyone, regardless of lifestyle, diet, or physical activity levels. It is not preventable and often appears suddenly, most commonly in children and young adults.

Without treatment, such as insulin therapy, individuals with T1D may experience acute symptoms like vomiting, confusion, and in severe cases, diabetic ketoacidosis or coma. Immediate and ongoing medical management is essential to avoid life-threatening outcomes. Thus, placing the T1D care in Tertiary Hospitals.

1.1.2 T1D in Netherlands

In the Netherlands, access to healthcare services is significantly influenced by regional factors, including one's postal code. This regional structure plays a key role in determining the healthcare providers and institutions available to individuals. Those diagnosed with chronic and demanding conditions such as T1D are integrated into a structured, tiered care model designed to address their needs progressively and comprehensively. Figure 1.12 represents an overview of how it is observed.

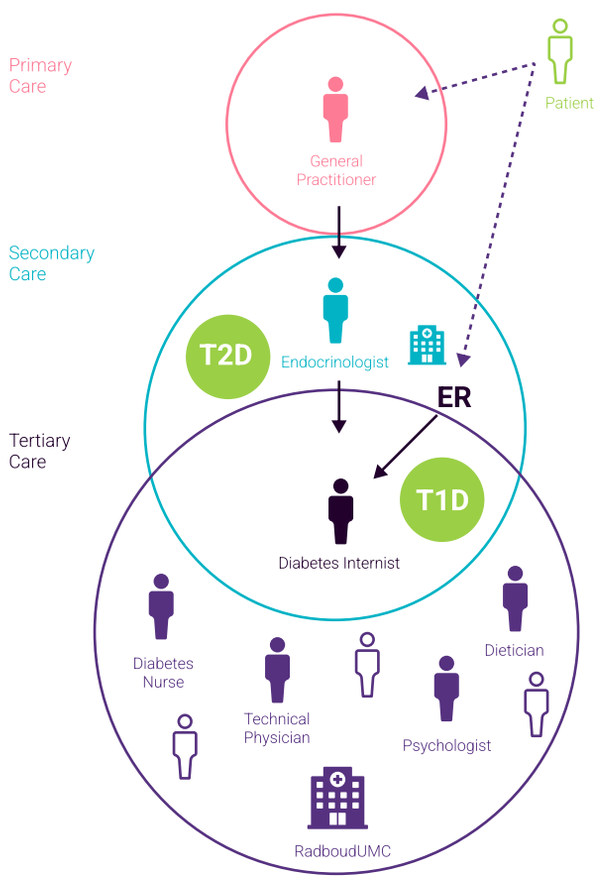


Figure 1.2: Relevant stakeholders involved in care provision for this project

Primary Care

Primary care, typically delivered through general practitioners (GPs or Huisartsen), forms the entry point into the healthcare system. The GP is responsible for identifying early signs and symptoms of diabetes, ordering initial diagnostic tests, and referring patients to appropriate specialists for diagnosis. In cases of T1D, GPs do not manage the condition long term but are potentially first person of contact. (Force, 2023)

Secondary Care

Secondary care includes general hospitals and specialist outpatient clinics. These services offer a moderate level of specialization and typically manage less complex or stable cases, like type 2 diabetes. T1D patients if not co-managed are transitioned to the next level, tertiary care hospitals. They may consult with an endocrinologist at secondary care to know more about the diagnosis and evaluations. Patient of an episode, where they fell unconscious may directly end up at secondary care in ER where they get their diagnosis after evaluations by endocrinologist. (Force, 2023)

Tertiary Care

Tertiary care is delivered by academic or university hospitals equipped to manage complex, chronic, or rare conditions. Institutions such as Radboud University Medical Center (UMC) and Erasmus Medical Center (MC) offer multidisciplinary care teams tailored to the needs of T1D patients. These teams typically include endocrinologists and or internists, diabetes nurses, dietitians, technical nurses (for treatment management), and, where appropriate, psychologists. This comprehensive model addresses both the physical and psychosocial dimensions of living with a lifelong chronic condition.

In the event of complications, tertiary care institutions also offer direct access to specialists such as ophthalmologists, nephrologists, and neurologists. This integrated and highly coordinated care structure is a defining characteristic of the Dutch approach to managing Type 1 Diabetes. (Force, 2023)

1.1.3 Trends in Healthcare

The goal of this PESTEL trends analysis is to explore the macro-environmental factors shaping the future of healthcare in the Netherlands in context of chronic conditions like T1D. This analysis identifies and synthesizes current Political, Economic, Social, Technological, Environmental, and Legal trends that are driving systemic change in Dutch healthcare.

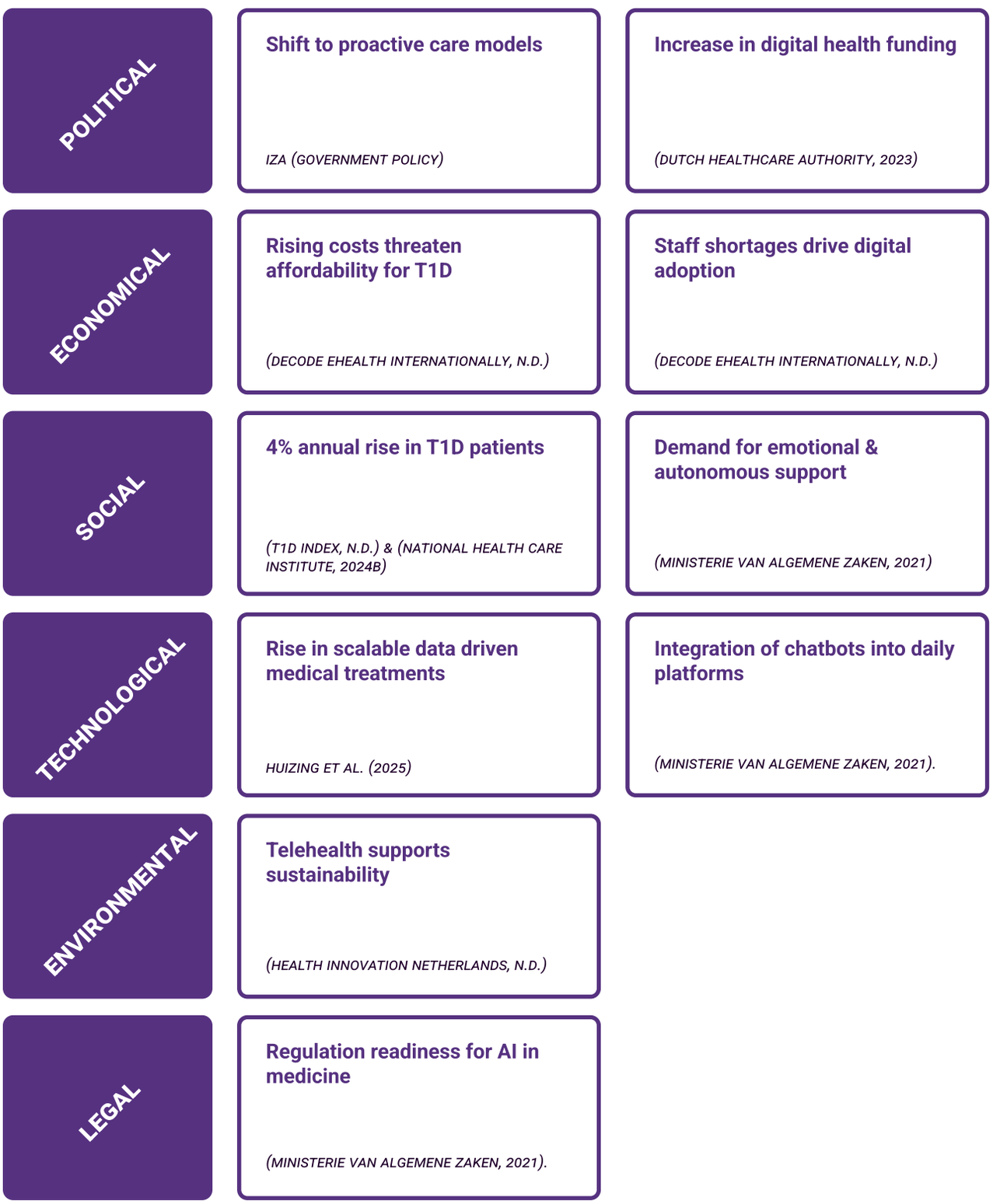


Figure 1.3: PESTEL Analysis

Political

The Dutch healthcare system is transitioning from reactive to proactive care models. A clear example is the evolution from the national IZA (Integral Healthcare Agreement) towards institution-level programs like DDD at RadboudUMC, which promote patient-centered digital care delivery (RadboudUMC, n.d.). Additionally, national and regional bodies are increasingly offering financial support to stimulate digital health innovation. Agencies such as Health Holland, ZonMw, and ROMs—alongside EU schemes like EU4Health—are actively funding public-private partnerships and research programs (Dutch Healthcare Authority, 2023). The Dutch Healthcare Authority (NZa) updated its funding framework in 2024, allocating €2.395 billion between 2023 and 2027 to support digital transformation through platforms like Digizo.nu and IZA-linked reimbursement mechanisms (Health Innovation Netherlands, n.d.).

Economical

Healthcare expenditures in the Netherlands continue to escalate, averaging approximately $7,200 per person as of 2021, a figure influenced by demographic aging and increasing chronic disease prevalence (Decode eHealth Internationally, n.d.). These cost pressures, coupled with critical staff shortages, are compelling hospitals to implement digital solutions to maintain quality and efficiency in care delivery (Decode eHealth Internationally, n.d.).

Social

The prevalence of chronic diseases, such as Type 1 Diabetes (T1D), is rising at an estimated 4% annually. Currently, about 100,000 people live with T1D in the Netherlands, including 7,000 minors (National Health Care Institute, 2024b). This trend, along with an aging population, has increased the demand for patient-centered, emotionally supportive, and autonomous care solutions—especially in long-term disease management (Ministerie van Algemene Zaken, 2021).

Technological

The national health innovation agenda supports a robust technology push, prioritizing the integration of AI, big data, and personalized digital treatments. Scalable, data-driven care models are on the rise, with support from both government policy and health institutions. Chatbots, once a novelty, are now being embedded in everyday digital ecosystems like WhatsApp, Instagram, and search platforms, aligning with mainstream international eHealth strategies (Ministerie van Algemene Zaken, 2021). Furthermore, physicians are becoming content creators, sharing health information and promoting awareness through social media platforms, which contributes to digital literacy and patient engagement.

Environmental

Sustainability is increasingly influencing health policy. Remote care models are being incentivized via programs such as SET and eHealth At Home, which aim to reduce patient travel, thereby cutting emissions and easing the healthcare sector's environmental footprint (Health Innovation Netherlands, n.d.).

Legal

The legal environment for digital health is evolving to accommodate reimbursement for telehealth, digital therapeutics, and virtual reality therapy. Dutch legislation is catching up to ensure that insurers cover these tech-enabled care services (Decode eHealth Internationally, n.d.-b; NFIA, 2022). In parallel, the Netherlands is preparing for a surge in AI-driven interventions. The EU AI Act will play a central role by defining regulatory standards, data governance, and readiness benchmarks to safely integrate AI into clinical workflows (Ministerie van Algemene Zaken, 2021b).

Conclusions | Trends

In the Netherlands, there is a strong political and technological drive to make public healthcare efficient through the adoption of advanced technologies. This transformation is supported by evolving legal frameworks aimed at regulating and facilitating these innovations. Economically, the sector faces growing pressure from rising healthcare costs, workforce shortages, and an increasing patient population. At the same time, the reimbursement landscape for digital health technologies is gradually adapting to support this shift, indicating a broader systemic readiness for digital transformation in healthcare.

1.1.4 RadboudUMC

Radboud University Medical Center (Radboudumc) is a leading academic hospital in the Netherlands that integrates patient care, scientific research, and education into a single, cohesive system. It operates with a strong mission to improve health and healthcare through **innovative, personalized, and sustainable approaches.**

Organizational Characteristics

As an organization, Radboudumc is deeply committed to providing top-tier, multidisciplinary clinical care while simultaneously advancing medical science through cutting-edge research. This integration ensures that scientific discoveries are rapidly translated into innovative treatments that benefit patients directly. **Education is a core** pillar of the organization, where Radboudumc trains future healthcare professionals and specialists, fostering continuous development of expertise within the medical community. The institution cultivates a culture of innovation, exemplified by departments such as the Health Innovation Labs, which focus on co-creating human-centered healthcare solutions. At its core, Radboudumc emphasizes patient-centered care that prioritizes the quality of life and meaningful outcomes, all while embedding **sustainability as a fundamental principle in its healthcare delivery**.

From a systemic perspective, Radboudumc functions within a broad network of collaborations, **working closely** with Radboud University as well as **regional, national, and international partners** to strengthen the healthcare and research ecosystem. The institution operates under a well-structured governance system that aligns strategic objectives with effective operational management, ensuring accountability and quality across all functions. Radboudumc adopts a holistic approach to health challenges, addressing everything **from prevention to treatment and rehabilitation, and integrating medical, psychological, and social factors.** Moreover, it leverages data-driven methods and artificial intelligence to enhance clinical decision-making, research productivity, and educational outcomes, **positioning itself as a modern and adaptive system** aimed at transforming healthcare for the future.

T1D at Radboudumc

At Radboudumc, the care for individuals with Type 1 Diabetes (T1D) is comprehensive and patient-centered. The **medical team** offers specialized treatments and support, aiming to manage blood glucose levels effectively. They provide guidance on lifestyle adjustments, including dietary recommendations and physical activity, to enhance overall health. Additionally, Radboudumc ensures a seamless **transition for young patients** moving from pediatric to adult care, maintaining continuity and quality of care throughout the patient's life.

T1D Medical Team

Managing Type 1 Diabetes (T1D) requires the coordinated expertise of healthcare professionals from multiple disciplines, making a multidisciplinary medical team essential. I view this team as comprising two tiers:

The Primary Care Team includes five key healthcare professionals: an internist, endocrinologist, diabetes nurse, dietician, and technical nurse. This core team provides regular support and can be reached through established triage systems or during annual check-ups.

The Secondary Care Team consists of specialized professionals who are consulted for complex or specific issues related to T1D. This team may include psychologists, ophthalmologists (eye specialists), nephrologists (kidney specialists), and neurologists. Consultations with these specialists are scheduled as needed, based on individual patient requirements.

Health Innovation Labs (HIL)

Radboudumc's Health Innovation Labs (HIL) focus on transforming healthcare through innovation. They collaborate with healthcare professionals to develop and implement new solutions that improve patient care and system efficiency. By integrating human-centered design, perseverance, and a willingness to experiment, HIL drives meaningful changes in healthcare delivery. They also offer advice and education on innovation, aiming to shape sustainable and personalized healthcare for the future.

This Thesis & Leefmaatje

This thesis is conducted in coordination with HIL and runs parallel to their ongoing project, Leefmaatje. At the outset of this thesis, Leefmaatje is positioned as a personalized, chat-based bot designed to support individuals living with T1D by delivering tailored information across various life stages.

While HIL's focus is primarily on the technical feasibility and patient desirability of the solution, **this thesis focuses on designing for its long-term viability as a sustainable service. This involves developing a well-defined business case, including a clear value proposition, identification of key stakeholders and their roles and responsibilities, and strategy for systemic introduction.**

Project Context & Approach

Rising T1D cases highlight the need for evolving, tech-enabled multidisciplinary care

Type 1 Diabetes (T1D) is increasing in prevalence and requires ongoing, multidisciplinary support. As the condition becomes more common, a key question emerges: how will care delivery adapt through technological advancements in the near future?

Demand for services that improve care quality while enhancing hospital workforce efficiency

There is a growing need for healthcare services that not only deliver better patient outcomes but also support hospital staff by streamlining workflows and improving operational efficiency.

Radboudumc accelerates innovation by integrating care, research, and education

Radboudumc's strength lies in its seamless integration of patient care, cutting-edge research, and medical education. This cohesive model allows scientific discoveries to be rapidly translated into clinical practice, fostering a dynamic environment where innovation directly benefits patients while simultaneously training the next generation of healthcare professionals.

Strategic bottom up approach

There is need to integrate voices of end users, healthcare professionals, and context, not only from principles but from systems point of view to better place and implement services like Leefmaatje. This lays the foundation of my strategy and design direction for my project.

Design fueled by voices of all stakeholders involved

This thesis explores a human-centered design approach in healthcare innovation, emphasizing the integration of diverse stakeholder perspectives including patients, and healthcare professionals. By actively involving all relevant voices throughout the design process, the project aims to develop more inclusive, effective, and sustainable service that align with real-world needs and complexities.

Healthcare, Chatbots & Buiness Case

Theoretical background of these three main domains is gathered in the course of this thesis with a strategic lens.

Chapter 02 | First Expedition

Preliminary Research

In this chapter

Background Image | *AI generated, the quick visualizer*

This chapter summarizes preliminary research conducted in the early design phase. It defines key concepts, outlines chatbot requirements and success factors, and provides a baseline assessment of the Leefmaatje service. A comparative review of digital healthcare services examines their integration and insurance backing. Expert interviews offer multidisciplinary insights into the viability and system-level implications of chatbot adoption.

Background Image | *AI generated, the quick visualizer*

2.1

Chatbots

Goal: This literature review is to synthesize existing research and practical insights on chatbot technology, with a focus on understanding the various design approaches, identifying key application areas particularly in healthcare outlining the necessary conditions for successful implementation, and determining the critical success factors that influence adoption and effectiveness in real-world settings. This was done by analyzing academic literature, case studies, and real-world implementations to capture both theoretical and practical perspectives.

2.1.1 What is a Chatbot?

"A computer program designed to have a conversation with a human being, especially over the internet," often referred to as a conversational interface or conversational user interface that enables communication between people and information systems using natural language (Skuridin & Wynn, 2024).

Chatbot Design Approaches

Chatbots, also referred to as conversational user interfaces, are AI driven systems designed to simulate human conversation using natural language (Skuridin & Wynn, 2024). Their architecture generally falls into two broad categories: scripted or rule based bots and AI driven or generative bots. **Scripted bots operate through predefined rules, using structured inputs like menus or tiles to guide interaction.** These are common in customer service and marketing scenarios where standardized responses suffice (Xue et al., 2023). In contrast, **AI powered chatbots leverage machine learning, particularly large language models (LLMs) such as GPT 4, to understand context, learn from interactions, and adapt over time** (Skuridin & Wynn, 2024).

The functionality of AI chatbots is built on various machine learning paradigms: **supervised learning, where bots are trained on labelled data; unsupervised learning, which involves clustering unlabelled data to detect patterns; and reinforcement learning,** where feedback loops help bots improve based on reward mechanisms. NLP (Natural Language Processing) enables chatbots to interpret inputs and produce coherent, often human like outputs.

Successful chatbot design begins with a structured development process, typically involving four stages: exploration, conversation scripting, design/testing, and continuous improvement (Skuridin & Wynn, 2024).This includes defining the bot's persona, tone, use case, platform, and device compatibility. Effective bots also incorporate conversation flowcharts, rich media, and error handling mechanisms.

Applications of Chatbots in Healthcare

Chatbots have diverse applications. In general industries, they streamline customer service, marketing, and internal operations through 24/7 availability and cost efficiency(Skuridin & Wynn, 2024). **In healthcare, their roles include mental health support, patient education, triage, and administrative automation**(Reddy, 2024; Xue et al., 2023). **Chatbots in healthcare can provide therapy like interactions, screen symptoms, manage chronic conditions, and even generate clinical documentation using LLMs** (Reddy, 2024).

Despite the potential, current evidence on the clinical effectiveness of chatbots remains limited. However, studies suggest users generally perceive them positively, especially in under resourced settings(Xue et al., 2023). **Personalization is a key engagement driver, with features such as chat history tracking, memory of past interactions, and adaptive dialogue enhancing user satisfaction**. Approximately 64% of healthcare chatbots evaluated exhibited simulated empathy, while 50% could engage in social dialogues to build rapport (Xue et al., 2023).

In administrative healthcare functions, chatbots integrated with LLMs automate documentation, schedule appointments, and process insurance claims, reducing clinician workload and minimizing errors(Reddy, 2024). Furthermore, in medical education, generative AI facilitates virtual patient simulations, personalized learning, and communication skill development.

Requirements for Implementation

Effective chatbot deployment hinges on several preparatory steps:

1. Business Objective Definition: Clear goals and measurable KPIs must be defined.
2. Data Preparation: Sourcing, cleaning, labelling, and structuring data is critical, especially in healthcare, where quality and compliance are paramount (Reddy, 2024).
3. Technical Infrastructure: This includes selecting appropriate platforms, ensuring data storage and management capabilities, and having access to computational resources for model training (Skuridin & Wynn, 2024).
4. Team Composition: Cross functional teams including designers, developers, copywriters, and subject matter experts ensure comprehensive development (Kousa, n.d.).
5. Regulatory Compliance: Healthcare bots must adhere to data protection laws like GDPR and HIPAA and embed privacy by design principles (Reddy, 2024).
6. An implementation framework consisting of five phases: initiation, planning, execution, monitoring, and closing. Iterative prototyping, involving limited scope pilots, is recommended to manage complexity and expectations (Kousa, n.d.).

Critical Success Factors (CSFs)

Several critical success factors contribute to the sustainability and efficacy of chatbot projects:

1. Project Management Triad: **Adherence to time, budget, and quality benchmarks is foundational, though flexibility is needed** for high tech projects where uncertainty is high (Skuridin & Wynn, 2024).
2. Leadership Sponsorship: **Executive support is essential for resource allocation and organizational buy in** (Kousa, n.d.).
3. User Centred Design: Designing for user needs, including tone, brevity, and seamless multichannel integration, increases adoption and satisfaction(Skuridin & Wynn, 2024).
4. Training and Maintenance: **Continuous training and iteration based on user data and logs are necessary to maintain performance over time** (Bhattaru et al., 2024; Skuridin & Wynn, 2024).
5. Evaluation and Analytics: Tools to track chatbot performance raw data logs, conversation outcomes, and satisfaction surveys enable ongoing improvement(Kousa, n.d.).
6. Accenture (2016) outlines five additional pillars: uniqueness of experience, understanding user behaviour, interaction ease, channel consistency, and robust data security. Projects that begin with internal use cases tend to build trust and readiness before scaling to customer facing solutions.

Challenges and Risks

Implementation challenges include unrealistic user expectations, platform fragmentation, integration difficulties, data silos, and lack of skilled labour (Skuridin & Wynn, 2024). In healthcare, skepticism about AI reliability, personalization limitations, and ethical concerns especially around data bias must be addressed(Reddy, 2024; Xue et al., 2023). Importantly, bots must avoid over promising capabilities. Poor configuration or self-service development without expertise often leads to failure and disillusionment with chatbot technology (Kousa, n.d.).

Conclusions

We see chatbot's effectiveness is highly dependent on matching the design approach with the intended use case. Rule-based bots may suffice for structured administrative tasks, while AI-driven bots, especially those powered by large language models (LLMs), are more suited for dynamic, empathetic, and personalized interactions. **Leefamaatje's service introduction and integration along with clear use cases need to be defined better in this regard.** Moreover healthcare, demonstrates high potential for chatbot integration, particularly in mental health support, chronic care management, and administrative automation. Lastly, successful implementation is not solely a technical endeavor but a cross-functional effort that includes clear objective setting, rigorous data management, adherence to ethical and regulatory standards, and patient-centered design. Literature also emphasizes critical success factors such as leadership support, agile project management, ongoing training, and thorough analytics. These are essential for maintaining user trust, bot relevance, and long-term system improvement. In conclusion, the current body of research provides both **a strong rationale Leefmaatje to become a trusted, scalable, and impactful digital companion in healthcare settings.**

A good bot doesn't try to pretend to be human. It tries to be a good bot—reliable, predictable, and clear.

Designing Bots: Creating Conversational Experiences
- Amir Shevat

2.2

Leefmaatje

Goal: The primary goal of this study is to evaluate the strengths, weaknesses, opportunities, and threats (SWOT) associated with Leefmaatje current proposal.

2.2.1 Service concept and evaluation

"Leefmaatje" is currently (Feb, 2025 at the start of the project) positioned as a personalized companion for people living with Type 1 Diabetes (T1D) with the purpose of supporting patients across life stages in managing T1D with tailored information.

Currently the hospital's role in Leefmaatje is to provide reliable and trusted sources of information. Placing emotional support in the chatbot? It is still a debatable question. It also has high fuzziness in terms of how the bot would adapt to a person to provide personalized information to patients and what information it can provide the patient; that is not medical advice. **For T1D, the priority is assistance in navigating information and queries, so the time in consultation is used by both the patient and the HCP to answer bigger queries.**

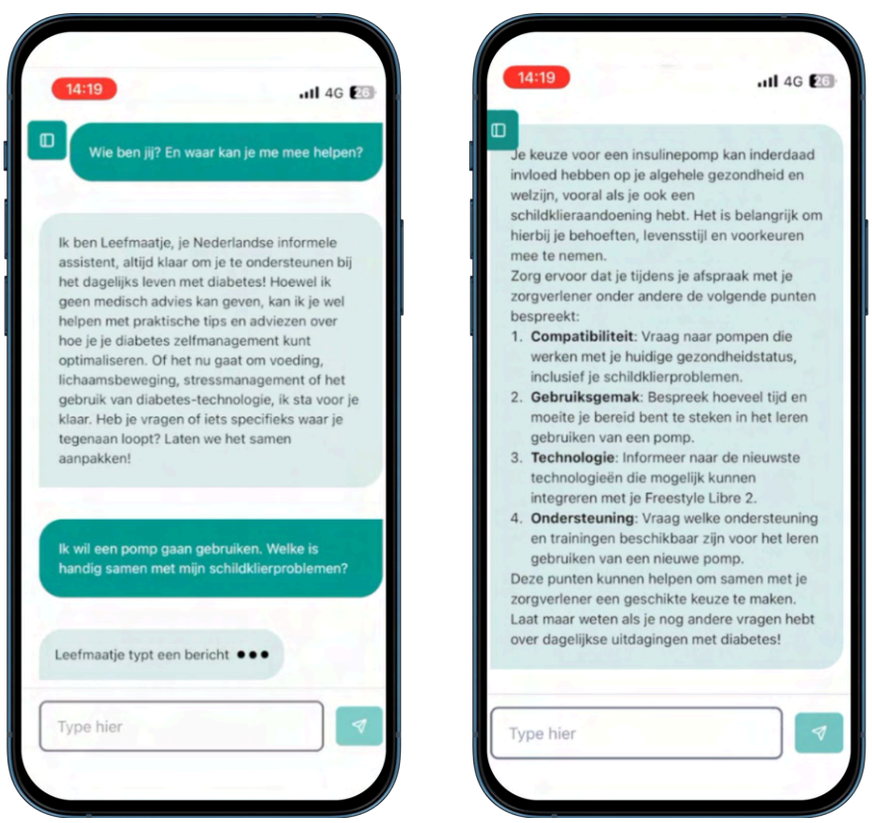


Figure 2.7: Leefmaatje Chat screens from Testing

2.2.2 SWOT Analysis

The Figure 1.8 presents a structured SWOT analysis of Leefmaatje, a healthcare chatbot designed to support patients. Strengths include personalized content delivery, trusted hospital-verified data, improved consultation efficiency, and 24/7 accessibility. Weaknesses highlight challenges in emotional support, personalization complexity, limitations in providing medical advice, and high implementation costs. Opportunities lie in addressing chronic care gaps, EHR integration, multimodal engagement, and feedback-driven improvements. Threats include user trust issues, data compliance risks, potential for misinformation, and rapid technological shifts.

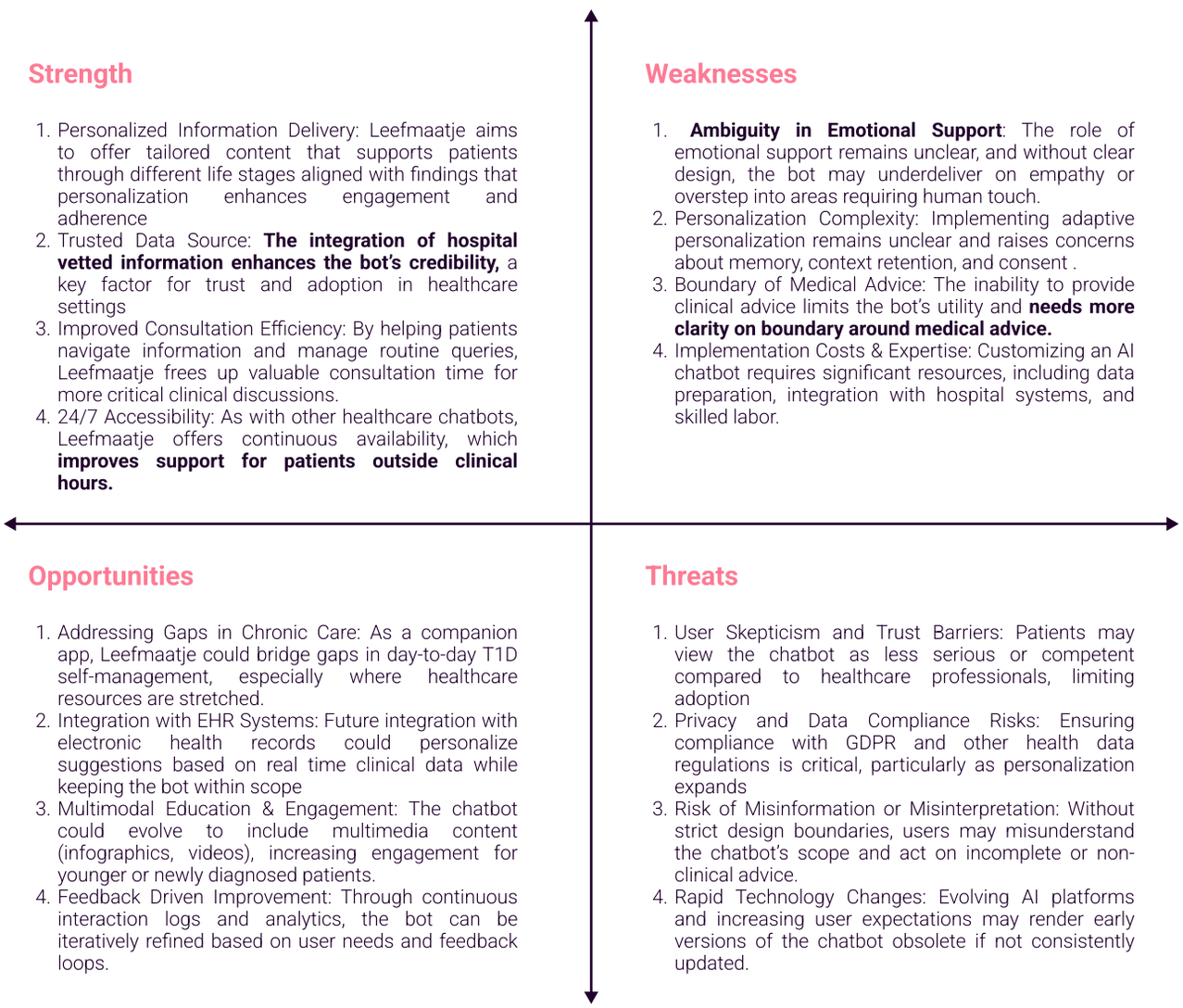


Figure 2.8: Leefmaatje SWOT Analysis

Conclusions

Leefmaatje holds strong potential as a digital companion for T1D patients by addressing informational overload. However, to succeed, it must clearly define its scope, especially regarding emotional support and medical advice, and how personalization would take place. The success of Leefmaatje will ultimately depend on its ability to build trust, deliver real value to its stakeholders.

2.3

Digital Services in Healthcare – A comparative study

Goal: To provide a comparative analysis of digital health platforms in the Netherlands and internationally, examining their functionality, integration with healthcare providers, emotional support features, role within the patient journey, and underlying commercial models. The aim is to distinguish between clinical-grade, provider-integrated solutions and consumer-oriented tools, while also identifying which services are typically reimbursed by insurance and the criteria required for reimbursement.

2.3.1 In Netherlands

Figure 2.9, shows comparative analysis of recent digital services in healthcare in Netherlands. These services were selected based on insurance reimbursement and critical patient target groups. All services seen below have two way proposition and are integrated in healthcare environment via hospitals/clinics.

Criteria	LUSCII	KSYOS	Patient Journey App
Function	Remote patient monitoring and home health care	Specialist teleconsultation (dermatology, sleep, cardiac, ENT)	Care pathway coaching, PROMs/PREMs, reminders
Placed	Homes & hospital EHRs	Patient homes via GP network	Integrated with hospital systems
Target Users	Chronic patients; clinicians	Patients needing specialist consults	Hospitals & their patients
Emotional Support	Minimal (education + monitoring)	Not central to offering	Basic reminders; limited peer/mental health
Integration with HCPs	Deep EHR integration; clinician dashboards	Close collaboration with GPs, specialists	Seamless EHR integration; data sharing
Commercial Model	B2B SaaS (hospitals & insurers)	B2B telehealth services financed by insurers	B2B SaaS to clinics/ hospitals

Figure 2.9: Comparative Analysis in Netherlands

2.3.2 Outside of Netherlands

Figure 2.10 presents a comparative analysis of successful digital healthcare services implemented outside the Netherlands. Among the services reviewed, Medimap stands out as the only non-chat-based platform, while Ada, Sweetlife, and Flo all utilize chatbot or conversational interfaces. Notably, these services operate primarily outside traditional healthcare environments, focusing on patient education as their core function similar to the approach taken by Leefmaatje. This highlights a promising positioning for such services in non-clinical settings. However, a common challenge observed is that most rely on a freemium model, often supplemented by partnerships or NGO support to sustain their operations.

Criteria	Medimap (US)	Ada (FR)	Sweetlife (SA)	Flo (GLOBAL)
Function	Clinic wait time visibility and appointment booking	AI driven symptom checker	WhatsApp diabetes education chatbot	Menstrual, fertility, pregnancy tracking
Placed	In between consultations, for admin purpose	Before entering clinical pathways, thus outside	Outside of pathways	Outside of healthcare pathways
Target Users	Walk in clinic users & providers	Anyone with symptoms	People with diabetes in South Africa	People tracking reproductive health
Emotional Support	None	Some reassurance via conversational AI	Content includes mental health tips	Offers community, education, some anxiety support
Integration with HCPs	None; patient to clinic directly	None; patient to clinic directly	None; content only	No formal integration: end user focus
Commercial Model	Marketplace fees or provider contracts	Freemium / enterprise B2B model	Free public service via NGO/ partners	Freemium + subscription revenue from end users

Figure 2.10: Comparative Analysis outside Netherlands

2.3.3 Insurance Coverage: What's Included, Excluded, and In the Grey Zone

The services listed above were critically examined from the perspective of insurance coverage, with a focus on understanding what insurers currently reimburse, what they explicitly exclude, and what might be eligible for future coverage.

What's Included

The listed services available in the Netherlands are all covered by insurance, though under varying guidelines. Luscii, in particular, is reimbursed for chronic care patients under provisions related to chronic care management and/or remote patient monitoring (home health). These services primarily operate under a B2B model, with patient-facing value propositions serving as a secondary component. Figure 2.11.

Category	Examples / Platforms	Why Covered
Remote Patient Monitoring (RPM)	Luscii	Considered part of chronic care or home health; reimbursable with monitoring fee
Teleconsultation	KYSOS	Covered under specialist referral and telemedicine guidelines
Digital PROMs/ PREMs & Care Coaching	Patient Journey App	If integrated into hospital workflows, often covered under bundled care packages

Figure 2.11: Comparative Analysis of service's insurance coverage

What's Excluded

Figure 2.12 highlights services that fall strictly outside the scope of direct medical or clinical care. These platforms focus on delivering general, non-personalized health information, playing a significant role in raising patient awareness. They operate independently from formal healthcare systems, emphasizing education and self-management rather than clinical intervention.

Category	Examples / Platforms	Why NOT Covered
Symptom Checkers / Health AI Tools	Ada	Considered informational only; not prescriptive or clinically validated in many systems
Wellness & Lifestyle Apps	Flo, SweetLife chatbot	Not clinical; focus on general wellness, education, or emotional support
Peer Support / Emotional Content	Podcasts, WhatsApp bots (SweetLife)	Not formally recognized as medical interventions

Figure 2.12: Comparative Analysis of service's insurance coverage

What's In the Grey Zone

Figure 2.13, outlines the conditions under which various support services are covered by insurance. Coverage is often limited to clinical settings or tied to specific programs such as certified therapy, hospital-based training, device reimbursement, or preventive care highlighting the need for alignment with formal healthcare pathways.

Service Type	Conditions for Coverage
Mental Health Support	Covered if provided via certified therapists or within a diabetes clinic setting
Educational Programs	Covered if tied to hospital based training
Device Training / Tech Support	Covered if part of device reimbursement (e.g., insulin pump training)
Lifestyle Coaching	Sometimes covered in preventive care programs

Figure 2.13: Comparative Analysis of service's insurance coverage

Conclusions

- Clinical connectivity: Both Luscii and Patient Journey App offer strong integration with healthcare providers via EHRs, unlike consumer first apps which remain standalone.
- Emotional & educational support: SweetLife and Flo are more targeted toward ongoing education and emotional reassurance, while clinical apps focus on monitoring and data.
- B2B vs B2C models: Health focused platforms (Luscii, KYSOS, Patient Journey App) operate B2B, aligning with systemic healthcare needs. Consumer apps (Ada, Flo) monetize via freemium subscriptions.
- Emotional support gap: Clinical platforms generally do not offer emotional support features a space where consumer/education apps fill in.
- Integration with HCPs: Accurate, synchronized care requires integration into clinical workflows only Luscii and Patient Journey App cater to that currently.

Digital services within public care are as an addition to EHR workflows to increase efficiency where as with a focus on monitoring and data management. Where as for emotional or educational support services are placed outside of public care. To be insurable The service must be clinically validated, and Hospital protocol compliant.

2.4

Expert Interviews

Goal: The goal of this expert interview study is to understand how a chatbot-based service like Leefmaatje can be effectively designed, positioned, and implemented within public care from the lens of an expert in healthcare design, business innovation, and AI. The study explores key challenges, stakeholder dynamics, and success factors for adoption, scalability, and alignment with system-level priorities.

2.4.1 Eric Gu

Background

PhD candidate in Industrial Design Engineering at TU Delft, affiliated with the Center for Law, Design & AI. Prior to academia, Eric spent eight years in innovation consulting, working on AI-enabled products for clients ranging from Fortune 100s to startups.

Design Considerations

There are two main implementation paths:

1. **Online platform** (e.g., Voiceflow) – Lower barrier to entry with usage-based pricing, ideal for lighter, scalable deployments.
2. **Hospital-integrated solution** – Requires full-stack development, clinical integration, and ongoing operational costs.

Approach to Solution Design

- Define: The core problem being solved
- The proposed solution
- The stakeholders involved

Then evaluate whether you have the three critical pillars for implementation with respect to stakeholders and needs:

1. Data
2. Expertise
3. Funding

2.4.2 Valentijn Visch

Background

Associate Professor at Delft's Industrial Design Engineering. With a background in arts, cinema, and emotion psychology, he focuses on leveraging game elements both digital and physical, to support behavior change in domains like mental and physical healthcare. Interview was to understand how to go around about introducing such service and placing it.

Design Considerations

- Once the intended outcome is defined, map the patient journey in relation to the solution.
- Identify all value exchanges across the journey who gives what, to whom, and where redundancies or inefficiencies exist.
- List key stakeholders and analyze their needs, motivations, and attitudes toward the solution.
- Use this mapping to answer critical implementation and design questions and ensure alignment with user and system needs.

2.4.3 Deborah Nas

Background

A Dutch innovation expert, keynote speaker, author, and part-time Professor of Strategic Design for Technology-Based Innovation at TU Delft's Industrial Design Engineering faculty. She has 25+ years in digital transformation across Philips, KPN, and her own innovation agency. The interview was shaped around placing of such an intervention.

Design Considerations

- Target tech-savvy users first (e.g., Freestyle Libre users); segment by demographics.
- Host via patient organizations or insurers, not hospitals or develop a unified chatbot for multiple hospitals.
- Personalize info contextually without personal data, keep it bite-sized to avoid overload.
- Build trust through endorsements by patient groups and outperform generic AI in relevance.

Conclusions

Valentijn's insights have been instrumental in shaping the value proposition of the service and identifying the key stakeholders required for successful implementation. Eric's perspective contributed to clarifying stakeholder roles, grouping them effectively, and evaluating the overall viability of the service model. Meanwhile, Deborah's input helped position Leefmaatje within the broader healthcare landscape, ensuring alignment with system-level trends and needs.

We need machines to help restore the human connection in medicine—not replace it.

Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again
- Eric Topol

Preliminary Research

Chatbots

Functionality: Scripted / rule based bots OR AI driven / generative bots

Chatbots play a multifaceted role in healthcare, including mental health support, patient education, triage, & streamlining administrative tasks.

Leefmaatje: *Fuzziness*

There is also ambiguity around the basis for personalization: what factors will drive it, and where does the service draw the line between general support and medical advice?

While the patient value proposition is evident and clear, the value it offers to healthcare providers or the product owner remains undefined.

The positioning of the Leefmaatje within the healthcare ecosystem is unclear, which appears to be the concept's most significant issue.

Comparative Study: Reimbursable services in Netherlands

Core reimbursable functions are Education programs, remote patient monitoring and preventive care.

B2B models are observed to be reimbursable in Netherlands

Integration with care pathways and or EHR systems are observed to be a way of introducing new services.

Expert Interviews

Need for clarity on intended outcomes of the service.

Technical feasibility is observed but viability and desirability for involved stakeholders needs more clarity.

Look for stakeholders from data, expertise and funding lens point of view, in order to gain clarity on stakeholders and their roles in the service.

Patient journey helps identify unmet needs and pinpoint where this service can deliver value.

Identify all stakeholders and value exchanges within the ecosystem to define the requirements and opportunities for effective service integration.

AI / Tech Business Health

Chapter 03: World of Chronics

User & Stakeholder Research

In this chapter

Background Image | *Leefmaatje Introduction Day at RadboudUMC*

This chapter presents user research and stakeholder analysis aimed at identifying pain points, priorities, and expectations surrounding Type 1 Diabetes (T1D) care. It explores for the first time how a service like Leefmaatje could align with or complement existing care pathways, depending on its placement within the formal care journey. The research includes a literature review on T1D care journeys, direct observation of patient interactions with (current version) Leefmaatje prototype, and an analysis of user and stakeholder interviews to inform needs and feature prioritization.

Background Image | *Leefmaatje Introduction Day at RadboudUM*

3.1

Care Journey Mapping in Type 1 Diabetes: A Literature Review

Goal: This literature reviews maps the T1D journey for across life stages, highlighting when individuals need information and empowerment, where things fall apart, and what support different systems (or lack thereof) surround them. To achieve this, I conducted a structured search for T1D patient care experience for minors as well as adults, selecting papers based on their diverse T1D lived experience, their methodological rigor, and their focus on different life stages. I reviewed and summarized each paper to extract common themes, challenges, and insights into the support systems surrounding individuals with T1D.

3.1.1 Diagnosis in Childhood

The moment of diagnosis often marks a profound disruption in the lives of children and their families. Studies by Ersig et al. (2016) and Stevens et al. (2022) describe this stage as an overwhelming collision with a new reality characterized by fear, medical jargon, and sudden lifestyle changes. Driscoll et al. (2025) further emphasize the psychological toll of identity disruption and information overload. Despite these challenges, early diagnosis often catalyzes rapid skill acquisition, supported primarily by parents and pediatric care teams. However, the literature identifies important gaps—particularly the limited attention given to siblings' roles, the social processing of peer reactions, and emotional coping models (Majumder et al., 2017; Shiel et al., 2023).

3.1.2 Early Adolescence (10–17 Years)

As children move into adolescence, a developmental push toward independence often clashes with the ongoing need for parental oversight. Shiel et al. (2023) describe this as a stage of "trial and error" in management, where technical proficiency begins to emerge, yet emotional and social challenges intensify.

Malak et al. (2025) highlight the tension between parental monitoring and adolescent autonomy, alongside issues such as burnout and stigma. While school nurses and peer networks play supporting roles, there is minimal focus on emotional literacy or broader social scaffolding beyond the family unit.

3.1.3 Emerging Adulthood (18–25 Years)

This period is marked by increased responsibility as individuals transition into adult healthcare systems and new life contexts like college or employment. Shiel et al. (2023) and Malak et al. (2025) point to common disruptions loss of pediatric follow-up, insurance instability, and a general sense of being unprepared. Yet, there are also gains: this is when many individuals develop independent problem-solving skills and more direct relationships with adult healthcare providers. However, the transition lacks structured safety nets and anticipatory guidance, particularly for those losing parental support (Malak et al., 2025)

Stage	Patient Experience	Pain Points	Gains	Stakeholders	Gaps / Missing Perspectives
Diagnosis (if in Childhood)	Overwhelming new reality, medical jargon, fear, sudden routine overhaul (Ersig et al., 2016; Stevens et al., 2022)	Shock, information overload, identity disruption (Driscoll et al., 2025)	Rapid skill acquisition, parental support (Stevens et al., 2022)	Parents, pediatricians, diabetes educators, HCPs	Siblings' roles, early peer reactions, emotional processing models (Majumder et al., 2017; Shiel et al., 2023)
Early Adolescence (10 to 17 yrs)	Push pull of independence vs. dependence, trial and error management (Shiel et al., 2023)	Parental monitoring tension, burnout, social stigma (Malak et al., 2025)	Technical mastery (BG checks, carb counting) (Shiel et al., 2023)	Parents, school nurses, peers	Minimal emotional literacy training, overreliance on parents (Shiel et al., 2023)
Emerging Adulthood (18 25)	Transition to self-management, new life contexts (college, work), shift in healthcare settings (Shiel et al., 2023)	Loss of follow up, insurance gaps, feeling unequipped (Malak et al., 2025)	Problem solving independence, stronger communication with HCPs (Shiel et al., 2023)	Adult care providers, friends, family (in new forms)	No clear safety net post parental support, lack of anticipatory guidance (Malak et al., 2025)
Adulthood (25+)	Management in context of career, relationships, finances (Majumder et al., 2017)	Insurance complexity, time constraints, psychological fatigue (Shiel et al., 2023)	System navigation confidence, sense of resilience (Shiel et al., 2023; Stevens et al., 2022)	Partners, GPs, endocrinologists, other specialists	Diminished social support, under discussed burnout (Ersig et al., 2016)

Figure 3.14: Patient Journey Mapping from Literature

3.1.4 Adulthood (25+ Years)

In adulthood, T1D becomes one of many life variables managed in parallel with work, relationships, and finances. Majumder et al. (2017) and Shiel et al. (2023) describe a shift toward greater confidence and resilience in self-management, though not without cost. Psychological fatigue, complex insurance landscapes, and limited social support systems pose persistent challenges. While healthcare partnerships often deepen, especially with endocrinologists and general practitioners, there is scant literature on sustained emotional support or community integration. Burnout remains underrecognized and underdiscussed (Ersig et al., 2016).

3.1.5 Off the Map Insights

Many emotional dimensions of living with Type 1 Diabetes (T1D), particularly among adolescents and their caregivers, remain underacknowledged in care models. One example is the anticipatory grief experienced by parents during their child's transition to independence. As Shiel et al. (2023) note, the shift from a mindset of "I'll handle it" to "Will they survive the night alone?" reflects a deep, often unspoken anxiety that care systems rarely validate or address. Similarly, for teens and emerging adults, the emotional labor of diabetes self-management can be immense. As Ersig et al. (2016) observe, many young people internalize blood glucose fluctuations as personal failures transforming a physiological variable into a measure of self-worth.

Healthcare settings themselves can exacerbate this burden. Rather than functioning as spaces for empowerment, routine visits often feel like performance evaluations, where teens expect judgment rather than support (Shiel et al., 2023). This surveillance dynamic undermines trust and openness in the clinical relationship. Compounding this is a striking absence of future-oriented framing. Stevens et al. (2022) highlight that young patients rarely engage in conversations about long-term planning or post-parental resources not because they lack interest, but because no one has modeled how to imagine a life beyond immediate threats or worst-case scenarios.

Instead, the future is often framed in fear-based terms ("you'll lose a foot") rather than in possibilities, guidance, or practical scaffolding for adult life with T1D.

3.1.6 Conclusion

Managing T1D is not just a clinical task; it's a deeply emotional, evolving experience entangled with life transitions. If care does not encompass these transitions or treat patients beyond the A1c scores, it will always be reflected in patients' ability to self-manage their condition poorly. **We also see the care journey can be seen in different phases, each of its different needs and experience.** The ambition? Need for service that respects independence while acknowledging contextual factors around a patient.

Informational Gaps

Poorly Supported Transitions Between Life Stages

Transitions, such as moving from childhood to adolescence or from pediatric to adult care are high-risk, high-impact periods where major shifts in responsibility, setting, and support occur (Dobson et al., 2017; Shiel et al., 2023; Stevens et al., 2022). However, these phases are marked by significant informational, emotional, and structural gaps. As young people gain autonomy, they often lose crucial supports like engaged parental oversight or consistent follow-up from pediatric providers, with limited tools to navigate these changes independently.

Incomplete Understanding of the Family Ecosystem

While parental involvement is well-documented in early T1D management, the broader family ecosystem including siblings and peers, remains underexplored (Shiel et al., 2023). Information is lacking on how these relationships influence coping, education, and long-term adaptation. Additionally, recurring challenges like parental burnout and parent-child tension are acknowledged but not well-integrated into education or support frameworks.

Static, One-Time Education Models

Education is heavily front-loaded at diagnosis, but long-term reinforcement is inconsistent (Majumder et al., 2017). Patients frequently report feeling unequipped when facing new challenges such as navigating insurance, managing workplace stress, or handling burnout. This suggests a critical gap in lifelong learning and adaptive guidance throughout the patient's evolving life contexts.

Shrinking Stakeholder Support in Adulthood

Despite the focus on technical proficiency in disease management, emotional and psychological needs remain insufficiently addressed across all stages (Stevens et al., 2022). Adolescents report stigma and a lack of emotional literacy, while adults encounter burnout and psychological fatigue that often go unspoken. There is a notable absence of structured emotional support or tools for developing mental resilience over time.

Weak Anticipatory Guidance & Missed Empowerment Opportunities

Across all life stages, care systems lack strong anticipatory frameworks to help patients prepare for future challenges (Shiel et al., 2023; Stevens et al., 2022). Instead of empowering patients with proactive knowledge and community connection, gaps in information and guidance contribute to disempowerment, stigma, and burnout—especially when individuals feel isolated from both care and peers.

Persistent Emotional and Psychological Blind Spots

Despite the focus on technical proficiency in disease management, emotional and psychological needs remain insufficiently addressed across all stages (Stevens et al., 2022). Adolescents report stigma and a lack of emotional literacy, while adults encounter burnout and psychological fatigue that often go unspoken. There is a notable absence of structured emotional support or tools for developing mental resilience over time.

3.2

Direct Observation Leefmaatje Introduction Day at RadboudUMC

Goal: To understand first impressions, trust dynamics, usability concerns, and content expectations of T1D patients when introduced to Leefmaatje, to refine its design, positioning, and implementation strategy for maximum impact and real-world adoption.This session was done in collaboration with DVN, Dutch diabetes association.

3.2.1 Introduction

During the initial exposure to the Leefmaatje chatbot, user reactions varied widely depending on age, experience with Type 1 Diabetes (T1D), and familiarity with digital tools. This session aimed to gather early impressions, assess trust and usability, and explore expectations around the chatbot's role in diabetes self-management and support.

3.2.2 Observation

Patients, especially younger and more experienced T1D users, often approached Leefmaatje with skepticism. They tended to test its knowledge by asking familiar questions, focusing heavily on its credibility. A recurring issue was the lack of clarity about the chatbot's limitations specifically, how it differentiates between general information and medical advice.

Trust was a central theme. Many participants said they would trust the chatbot more if it were endorsed by a hospital or healthcare provider, but feared it might then become another impersonal institutional tool. Transparency around where information comes from was critical, with some users comparing the chatbot to generic AI tools like ChatGPT.

Younger **users voiced concerns over cost, expressing reluctance to pay out of pocket given the ongoing expenses of managing T1D.**

Older patients, on the other hand, responded with curiosity and appreciation, noting how useful such a tool would have been in earlier stages of their care.

Additional User Insights

Participants highlighted the need for guided onboarding to clarify Leefmaatje's role, capabilities, and limitations. Many users found some Leefmaatje's responses too long or overwhelming, expressing a preference for shorter, clearer messages. The tool was seen as particularly useful during care transitions or soon after diagnosis, when patients often face information overload and emotional stress. **A notable benefit was its 24/7 availability, with several users appreciating the freedom to ask questions at any time, especially during late-night moments of uncertainty.**

Topics of Interest

Users were eager to discuss lifestyle-related topics, including sports, travel, and general well-being. Food and nutrition emerged as a frequent area of interest, especially around managing diabetes in real-life scenarios. Others were concerned with work-life balance, including how to manage stress and fatigue while maintaining treatment routines. **Several users also valued the chatbot as a safe space to raise sensitive or private questions they might hesitate to ask their healthcare providers directly.**

Conclusions

Initial user engagement revealed that while Leefmaatje holds promise as a supportive tool in T1D care, its success hinges on building trust through transparency, clear communication, and thoughtful positioning within the care journey. Emotional resonance, practical relevance, and institutional credibility will be key to driving adoption, particularly among skeptical, experienced patients.

> *If it comes from my hospital, my doctors, I'll trust it more*

A 25-year-old female patient diagnosed with T1D 5 years ago

3.3

Stakeholder Analysis

Goal: To understand the needs, expectations, power dynamics, and potential resistance of different stakeholders involved in the T1D care ecosystem who may be affected by introduction of Leefmaatje. Each stakeholder profile was grounded in 2 qualitative interviews.

3.3.1 Introdution

This stakeholder analysis provides a foundational understanding for the Leefmaatje chatbot project by mapping the roles, influence, motivations, and concerns of key stakeholder groups, including adolescents with T1D, their parents, healthcare professionals, hospital innovation leadership, and patient advocacy representatives. The analysis draws on semi-structured interviews (Appendix B) to construct detailed profiles, highlighting the interplay between emotional investment, system integration, and care innovation.

The methodology is informed by established approaches to stakeholder influence mapping and visualization, which emphasize the need to consider both power and emotional proximity in complex innovation settings (Bourne & Walker, 2005). This was done by first forming a template and then deriving questions for semi-structured interviews, which would help me fill in the template. Additionally, this work applies sense-making strategies that move beyond static grids to capture the relational, dynamic, and behavioral dimensions of stakeholder engagement (Reed et al., 2009). By combining qualitative interview data with theory-informed mapping techniques, this analysis aims to support implementation, user alignment, and long-term value realization for the Leefmaatje intervention. Refer Appendix C for detailed stakeholder analysis

3.3.2 Limitations of Analysis

One key limitation is the evolving nature of stakeholder identification. As the analysis progressed, it became evident that new stakeholders continued to emerge, highlighting the complexity of mapping to all relevant parties. Additionally, decision-making within stakeholder groups is rarely centralized. Often, no single individual has full authority, leading to redirection across different roles and departments.

The complexity is further amplified in healthcare, where multiple layered entities exist, each composed of various stakeholders who may need to collaborate to act as a unified entity. This interdependence makes stakeholder engagement and coordination particularly challenging.

Lastly, the insights gathered are largely based on qualitative interviews, which, while rich in context, are inherently subjective and may not fully represent the broader views or decision-making dynamics of entire stakeholder groups or organizations.

Stakeholder: Patient (T1D)

Type: User

Goal

- Make daily diabetes care easier and less isolating
- Gain emotional and lifestyle support, not just clinical advice
- Use tech that adapts to mood, habits, and fluctuations
- Feel seen and respected, not just managed

Needs

- Burnout support and help with everyday routines (insulin, food, mood)
- Trustworthy, 24/7 info in plain language
- Personalized experience not generic or clinical
- Curious but skeptical; will test bot's usefulness first
- Wants the tool to integrate with existing care

Influence

Moderate

- Indirect yet powerful: influences success through usage, feedback, and community word-of-mouth
- Emotional authority and real-world insight, but not institutionally included

Interest

High

- Deeply affected by the quality and sensitivity of the tool
- Strong alignment with project values if built around real needs

Pains

- Fear of being judged or misunderstood by AI
- Lack of personalization or integration with care team
- Generic, robotic, or irrelevant advice
- Emotional lows not being acknowledged

Figure 3.15: Patient Stakeholder Persona

Stakeholder: Family Members

Type: User

Goal

- Raise a confident, independent child living well with T1D
- Maintain a supportive relationship not dominated by diabetes
- Reduce emotional and mental caregiving burden
- Detect emotional or behavioral risks early
- Gain meaningful, non-patronizing insights and support

Needs

- Emotional and practical support without increasing stress
- Empowerment tools for child, not fear-based control
- Credible, real-time info tailored to their child's behavior
- Tools that improve communication and reduce friction
- Interested in features that support autonomy and emotional wellbeing

Influence

Moderate

- Gatekeeper for access to care tools and routines
- Directly impacts child's experience and adoption of tech
- Emotional influence over child's engagement and perception of care

Interest

Very High

- Deeply invested in outcomes, both short- and long-term
- Alignment is strongest when tools support both autonomy and emotional support

Pains

- Overwhelm from alerts or irrelevant info
- Feeling like a "bad parent" or being blamed
- Increased tension if tech is too controlling
- Lack of fit with clinical guidance or care transitions
- Affordability and system recognition

Figure 3.16: Family Member of T1D Stakeholder Persona

Stakeholder: Health Care Providers

Type: Internal

Goal

- Improve self-management and autonomy for patients
- Reduce unnecessary or low-value consultations
- Strengthen transitional care for adolescents
- Support education that's accessible, personalized, and context-aware
- Promote more meaningful, data-informed consultations
- Enable proactive, precision-guided support via tech

Needs

- Use chatbot to manage repetitive queries and patient prep
- Increase scalability and quality of care through digital support
- Support patient emotional wellbeing and engagement, especially during transitions
- Reduce caregiver and system burden while maintaining safety and trust
- Create opportunities for care innovation and real-world research

Influence

High

- Directly shape patient experience, care pathways, and tech integration
- Influence departmental and system-level implementation decisions
- Serve as technical and clinical interpreters for both patients and colleagues

Interest

Very High

- High involvement in tech-related care delivery
- Strong alignment with chatbot goals, especially around improving support, communication, and transition phases

Pains

- Over-reliance on chatbot for clinical or ethical decision-making
- Elderly or adolescent patients' digital readiness
- Risks of depersonalization, misinformation, or overgeneralization
- Chatbot integration into care without overwhelming clinicians or patients
- Unclear boundaries between tech assistance and clinical responsibility

Figure 3.17: Healthcare providers of T1D Stakeholder Persona

Stakeholder: Hospital

Type: Internal

Goal

- Drive sustainable, scalable innovation in healthcare
- Ensure chatbot has a viable business case and long-term ownership
- Improve patient empowerment and care efficiency without increasing system burden
- Learn from and avoid repeat failures of unsupported pilots (e.g., "Susan" chatbot)

Needs

- Desire for feasible, desirable, and viable innovations
- Ownership clarity: who maintains and scales the chatbot?
- Strategic alignment with Radboud UMC's innovation roadmap
- Integration with existing hospital systems, departments, and funding structures

Influence

High

- Deeply connected to institutional leadership, research, and innovation policy
- Plays a key role in validating, launching, and transitioning innovations toward real-world care environments

Interest

Very High

- Strong supporter of digital health innovations, provided they are accountable, sustainable, and clearly positioned within the care ecosystem

Pains

- "Ownerless" innovations that fade after pilots
- Lack of institutional alignment, unclear business models
- Integration difficulty in large healthcare systems
- Regulatory complexity, data privacy concerns
- Behavioral resistance from clinicians and patients

Figure 3.18: Hospital Stakeholder Persona

Stakeholder: Patient Association

Type: External

Goal

- Foster proactive, personalized care models rooted in empathy and behavioral insight
- Champion emotionally resonant, human-centered technology
- Bridge gaps between patients, caregivers, clinicians, and developers
- Ensure health tech aligns with ethical, system-level reform and value-based care.

Needs

- Strong interest in emotionally intelligent support tools
- Emphasis on behavioral relevance, not just medical accuracy
- Advocacy for transparent data practices and non-commercial exploitation
- Expectations of real integration into healthcare systems, not just external apps
- Tools should empower both patients and caregivers, not burden them

Influence

High

- Thought leader in digital health reform
- Embedded in innovation discourse with access to decision makers
- Brings rare combination of lived experience (as parent/ patient) and system-level view

Interest

Very High

- Committed to emotionally nuanced, behavior-aware, and ethical digital health
- Supports chatbot vision if it drives real change, not just cosmetic innovation

Pains

- Risk of superficial tech that fails to meet complex emotional needs
- Overload of data without actionable insights
- Ethical concerns about data commercialization
- Lack of ownership or system integration leading to wasted potential

Figure 3.19: Patient Stakeholder Persona

Conclusions

Patients, families, clinicians, hospital leaders, and patient associations show high alignment with the chatbot's goals especially around reducing care burden, empowering users, and improving self-management. However, each group emphasizes different success criteria

1. Patients prioritize emotional resonance, personalization, and feeling heard.
2. Families seek reduced friction, better communication, and adolescent independence.
3. Clinicians value reduced workload, better-prepared patients, and responsible integration.
4. Hospital leaders focus on ownership, sustainability, and system alignment.
5. Patient associations advocate for trust, user-centred design, and ecosystem integration.

Leefmaatje must be positioned as part of the existing care continuum not a parallel or disconnected tool. Integration with hospital systems, care teams, and family dynamics is crucial. Lack of integration is perceived as a deal-breaker by several stakeholders.

There is no single decision-maker stakeholders have overlapping influence but operate within siloed structures. Implementation will require managing across multiple roles and departments, especially in hospitals and insurer contexts.

The stakeholder analysis reveals strong overall support for the Leefmaatje chatbot concept, particularly in its potential to enhance self-management, emotional support, and personalization in Type 1 Diabetes (T1D) care. However, it also surfaces key tensions, structural complexities, and design challenges that must be addressed for successful adoption and sustained use.

3.4

Feature Prioritization

The goal is to translate stakeholder insights from the previous analysis into a clear, prioritized feature framework across three critical levels User (Patient/Family), internal provider (Hospital), and external Provider (Patient Association). By categorizing each group's needs into Must-Haves, Should-Haves, and Nice-to-Haves, this section informs product design, implementation planning, and strategic alignment.

3.4.1 Introdution

The MoSCoW analysis (Kostev, 2023) was used to categorize the various needs identified so far. Figures 3.20, 3.21, and 3.22 illustrate this categorization for three user groups: family members and patients, the hospital as an internal provider, and the patient association as an external provider.

Patient / Family (User Level)

Must Haves	Should Haves	Nice to haves
Safe and trustable sources of information	Should support patient in his/her current lifestyle. Adapt disease to lifestyle than other way round	More than just a chat feature, additional value in helping with self management or connecting to similar patients
24 by 7 Availability	Anticipatory Guidance	Customize way of interacting with the bot
Someway integrated in current care not an additional expense	Should help parent and child when in minor care as the self management is a combined effort	Positive reinforcements as T1D has a lot of stigma around it.
Personalized to ones care plan, context around and daily routines		Visual indicators like "Happy Time in Range"

Figure 3.20: MoSCoW Analysis - User

3.4.2 Patient / Family (User Level)

The must-haves at the user level focus on **trust, relevance, and integration into daily life. Information must come from safe and reliable sources, be available 24/7, and support patients in maintaining their lifestyle, not reshaping it.** The system should offer personalized support aligned with individual care plans and daily routines, while ensuring positive reinforcement to combat stigma. It must also be integrated into existing care and support joint management efforts between patients and caregivers, especially for children.

3.4.3 Hospital (Internal provider)

At the system level, the must-haves are grounded in strategic alignment and operational value. The solution must have a clear **business case, align with RadboudUMC's strategic goals,** and ensure **system integration without duplicating existing services.** It should be cost-effective, sustainable, and promote collaboration with stakeholders. Compliance with regulatory standards (AI Act, MDR) is non-negotiable, and any new system must show early promise and potential for scalability.

Hospital (Internal provider)

Must Haves	Should Haves	Nice to haves
Clear Business case in terms of how it helps the Hospital improve care provision, and or work efficiency.	Align with RadboudUMC's existing strategy	Licensing or external ownership routes
System integration, what services would it be replacing. DO NOT want another service that serves similar purpose as another	Low cost or efficiency gains and sustainable	Combined effort with different relevant stakeholders, for example patient groups, academic institutes etc.
Compliance with AI Act & MDR	Should be scalable	Early positive results from experimentation
Viability, desirability, feasibility balance		

Figure 3.21: MoSCoW Analysis - Internal Provider

3.4.4 Patient Association (External Provider)

For patient associations, must-haves emphasize **trustworthy, contextual, and patient-centered education. Information must be personalized, reliable, and ideally hospital-branded to increase credibility.** The tool should also support ongoing patient advocacy, helping to restore or grow patient engagement. It must be adaptable across demographics and transparent about data use and ownership, while also being capable of integrating with existing initiatives to maximize impact.

Patient Association (External Provider)

Must Haves	Should Haves	Nice to haves
Patient Centered and context sensitive information provision Personalization	Reinforce that education for T1D is life long and not one time may not consistently needed	Experience information provision highly appreciated by patients
Reliability and trusted sources of information Hospital branded content	Data helps in patient advocacy and supports the well rounded statements	Adapts across demographics
Help retain or increase the fallen patient subscription numbers in turn improve business	Transparency on data and ownership if retained	Ability to be integrated with ongoing initiatives

Figure 3.22: MoSCoW Analysis - External Provider

Conclusion: Future Value Propositions

Looking ahead, the service holds strong value propositions for both internal (hospitals) and external (patient associations) providers. For healthcare professionals (HCPs), it can improve workflow efficiency, enhance patient engagement, and enable proactive care through data-driven insights. For patients, it offers personalized support, trusted information, and better self-management, ultimately leading to improved health outcomes and quality of life.

Scenario 1: Hospital as Service Provider (Internal)
In this model, the hospital integrates the service directly into its care pathways.

- For HCPs: Leefmaatje potentially reduces routine follow-ups.
- For Patients: Seamless integration ensures continuity of care, with reliable, personalized information and 24/7 guidance that feels like an extension of the clinical team.
- Added Value: Strengthens hospital's position as an innovator while improving operational efficiency and patient satisfaction.

Scenario 2: Patient Association as Service Provider (External)
Here, the patient association offers the service as a community-driven support tool.

- For HCPs: Acts as an educational and engagement extension, reducing their load by empowering patients indirectly.
- For Patients: Provides peer-based emotional support, experience-based guidance, and trusted content in a more accessible and relatable way from Hospitals.
- Added Value: Rebuilds patient association engagement, boosts subscription rates, and creates a feedback loop for patient-led innovation and advocacy.

User & Stakeholder Research

The role and limitations of Leefmaatje were highlighted again, especially around its positioning within the care system.

Direct Observation

Patients expressed reluctance to pay out of pocket for the Leefmaatje service, highlighting the need for institutional support or reimbursement.

Direct Observation

Throughout the T1D journey, individuals often seek support that meets both their informational and emotional needs, particularly in the form of anticipatory guidance.

Literature Review

For Leefmaatje to be effective, it must be embedded within existing care pathways, not positioned as an external add-on otherwise, it risks being perceived as just another generic information service.

Stakeholder Analysis

The 24/7 availability and the ability to lower the barrier for asking private or sensitive questions were viewed as strong value propositions.

Direct Observation

The service's role in guiding patients through different stages of their care journey was emphasized, especially during transition moments, which are typically marked by information overload and emotional stress.

Literature Review & Direct Observation

A clear value proposition for hospitals remains underdeveloped; however, healthcare professionals (HCPs) and patient associations are seen as potential beneficiaries of such a service.

Stakeholder Analysis

Patients want T1D to adapt to their life style rather than them adapting to T1D way of lifestyle!

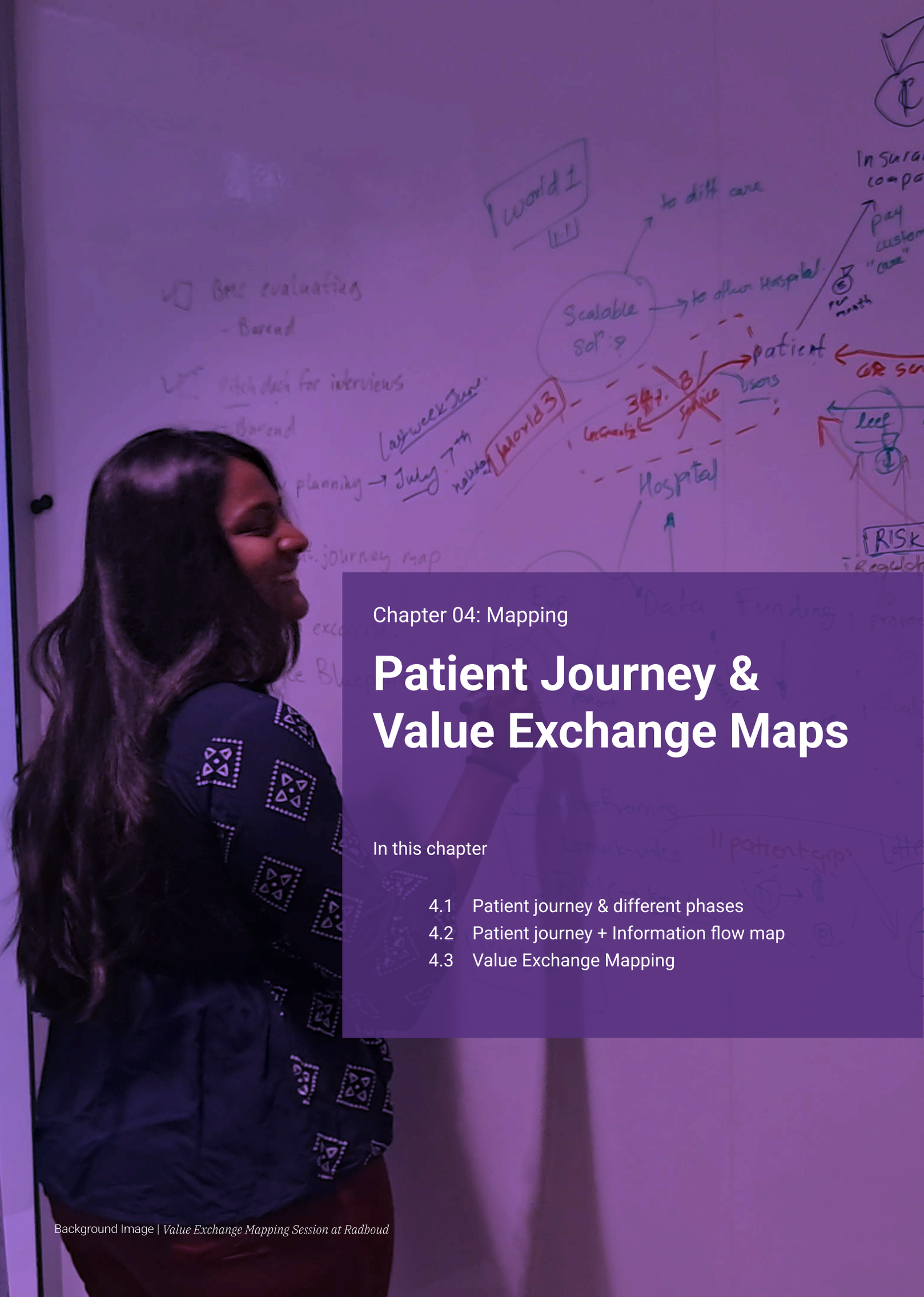
Direct Observation

Two possible future providers for Leefmaatje were identified:

1. **Hospitals, for integration into clinical care pathways.**
2. **Patient associations, for community-based support and education.**

Stakeholder Analysis

AI / Tech Business Health



Chapter 04: Mapping

Patient Journey & Value Exchange Maps

In this chapter

Background Image | *Value Exchange Mapping Session at Radboud*

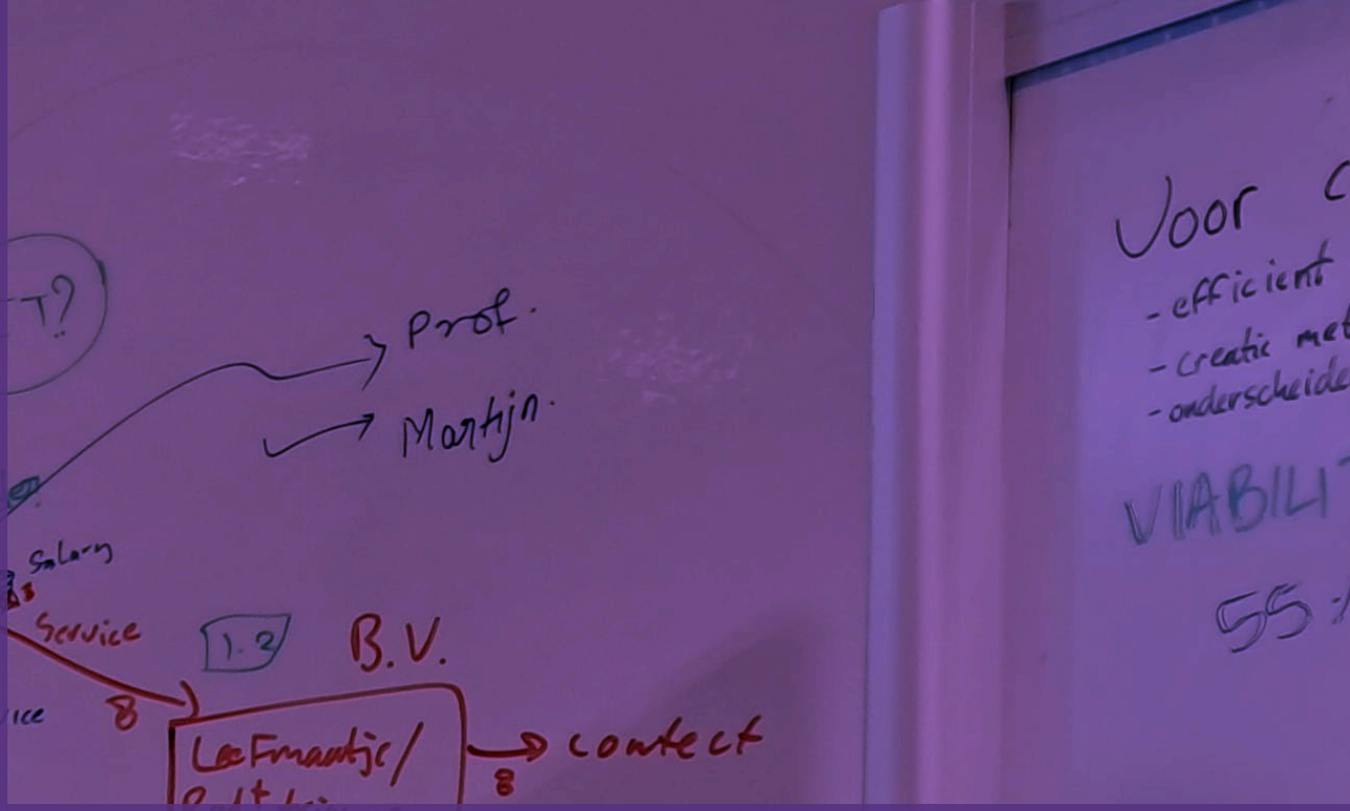
Define

Research

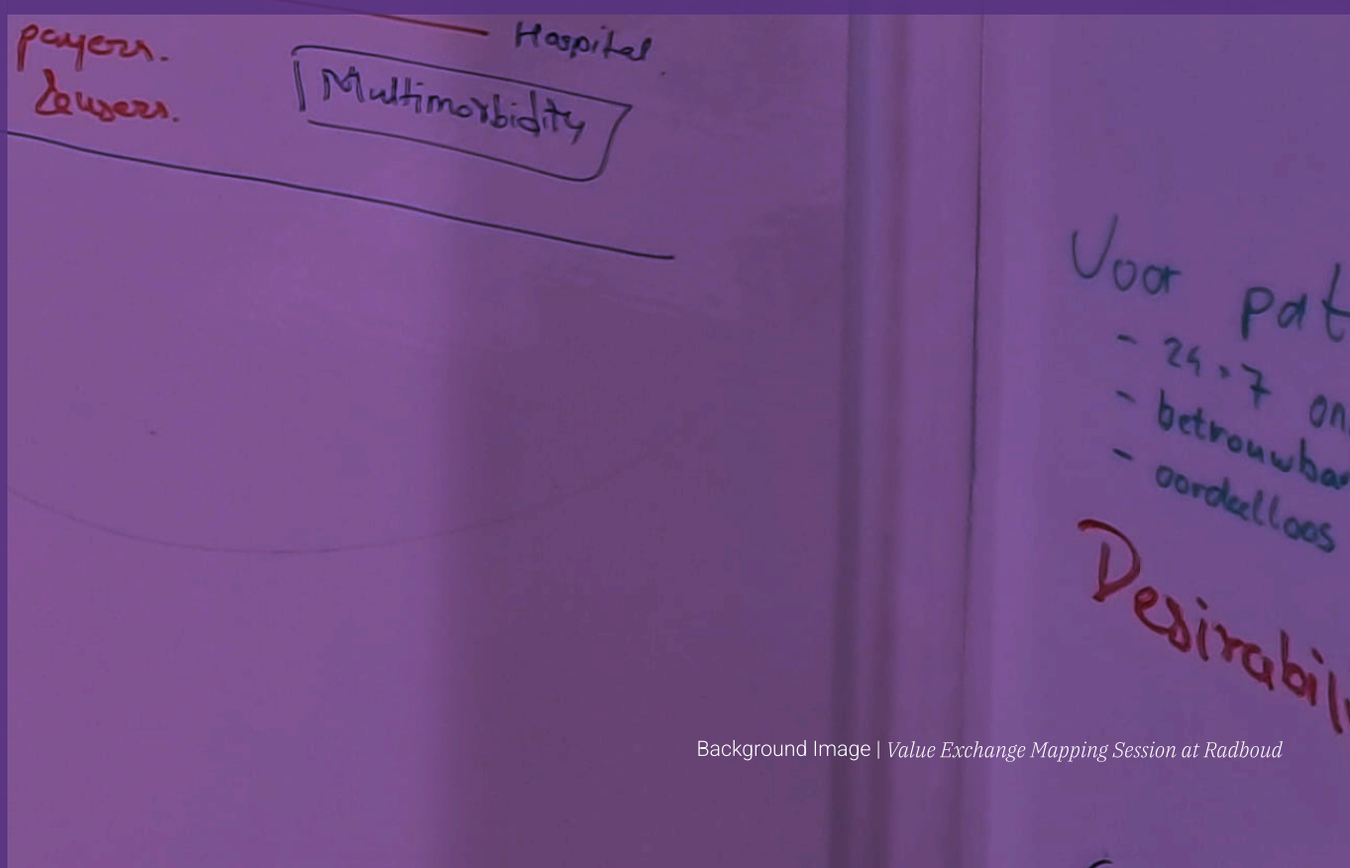
Synthesis

Design

Test



This chapter compiles insights from seven patient interviews and interviews with healthcare professionals (including an internist and a technical physician) to construct a patient care journey for individuals with Type 1 Diabetes (T1D). The journey is further enriched by findings from existing literature to enhance its depth and ensure triangulation. In parallel, value mapping sessions conducted at RadboudUMC contributed to the development of a value exchange map, illustrating the key interactions and value flows within the T1D care ecosystem.



Background Image | *Value Exchange Mapping Session at Radboud*

4.1

Patient journey & different phases

The goal of this research activity is to identify and define the distinct phases within the Type 1 Diabetes (T1D) care journey from the patient's perspective at Radboudumc, highlighting how personal context, communication, and support systems influence their decision-making and adaptation over time. By mapping these phases and uncovering the stakeholder dynamics within each stage, the research aims to inform the next research activity. At the same time, it's important to view this through an empathetic lens: patients want Type 1 Diabetes to fit into their lifestyle, rather than having to reshape their lives around the condition.

4.1.1 The evolving nature of chronic care in type 1 diabetes

The chronic care experience is deeply shaped by personal life events. How patients make decisions throughout this journey depends on the context in which they live and the support and communication channels available to them. Currently, these channels include a mix of formal healthcare services and informal support systems, both of which are often limited by the availability of healthcare professionals or community association members.

As the iterations progressed, interesting patterns emerged in the Type 1 Diabetes (T1D) care journey. From the healthcare provider's perspective, the journey does not typically follow distinct phases. Instead, patients are often thrust into care, overwhelmed with restrictions and instructions, mostly focused on what not to do. This approach puts patients and their families in distress, who often express a desire for the condition to fit into their lives, rather than having to entirely reshape their lives around the condition. Their ideal is to maintain their lifestyle, while incorporating necessary measures to manage T1D.

However, through observation and supported by the literature review in Chapter 2, it becameclear that the care journey can, in fact, be characterized by distinct phases, particularly when considering the flow of information and patient adaptation. These phases can be outlined as:

Phase 1: Diagnosis

This phase typically begins with a critical event often involving the patient collapsing and being rushed to the emergency room, followed by admission to the ER. It's a highly distressing moment for both the patient and their family, marked by fear and uncertainty, as the patient may have experienced it as life-threatening situation. After a series of blood tests and essential hospital procedures, a diagnosis of T1D is usually confirmed. However, this diagnosis often comes without a clear explanation, as the underlying cause of T1D remains largely unknown.

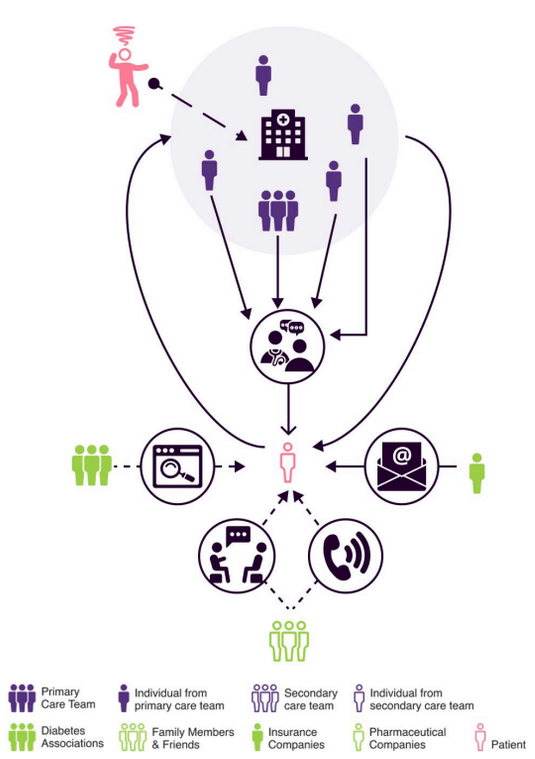


Figure 4.19: Phase 1, Diagnosis Stakeholder Mapping

During this initial phase, the patient meets various healthcare professionals, including emergency staff, a primary care internist, and potentially a diabetes nurse. In more complex cases, specialists from the secondary care team may also be involved. These first interactions are typically in-person and one-on-one.

Simultaneously, patients and their families begin navigating the administrative side of the diagnosis. They often contact insurance providers via email to initiate coverage for T1D-related treatments and supplies. In parallel, patients frequently begin searching online for information about the condition, which may lead them to diabetes patient associations or support communities.

Family and friends also play a vital role at this stage. They often offer emotional support and share personal experiences, especially if a relative has lived with T1D. This informal, out-of-hospital information is often seen as trustworthy and relatable, adding another important layer to the patient's early understanding of their condition.

queries to the internist. This confusion highlights a gap in patient preparedness for the volume and complexity of information they receive.

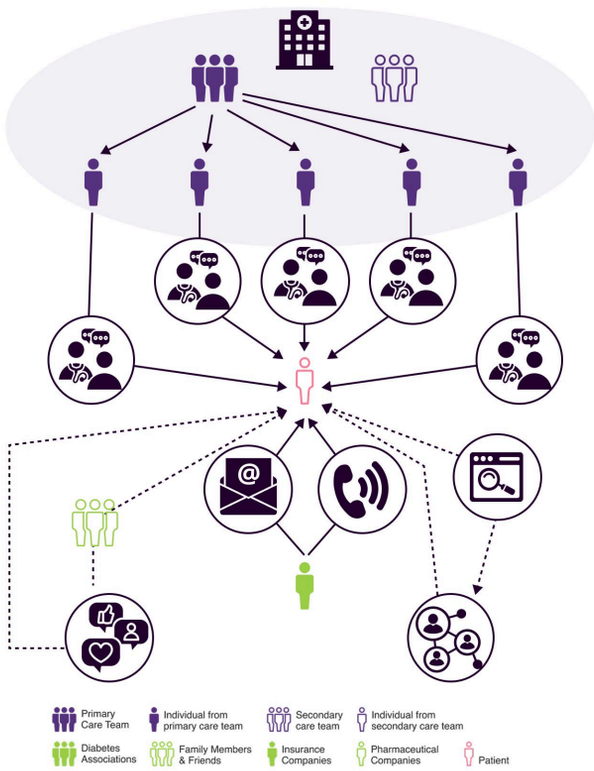


Figure 4.20: Phase 2 Onboarding Stakeholder Mapping

Phase 2: Onboarding

At this stage, patients are formally introduced to their full multidisciplinary primary care team. This typically includes an internist, diabetes specialist, endocrinologist, diabetes nurse, dietitian, and, when necessary, a technical nurse who provides device-related support. In addition, patients may also be referred to a secondary care team consisting of specialists such as psychologists, ophthalmologists (eye care), nephrologists (kidney care), and neurologists. All these interactions are in-person and one-on-one, usually taking place in a hospital setting.

During this phase, patients receive a broad range of information related to managing different aspects of T1D. However, healthcare professionals have observed that patients often feel overwhelmed frequently repeating questions or directing them to the wrong specialist, such as asking a technical nurse about medication or posing device-related

At the same time, patients and their families are actively seeking external sources of information. They search online, read personal accounts, and sometimes engage with diabetes communities to better understand the condition from a lived experience perspective. Social media platforms often serve as perceived trustworthy sources of information. Meanwhile, patients continue to interact with insurance providers to clarify coverage, adding to the logistical and emotional burden.

Clinically, this phase often includes the initiation of a "honeymoon" treatment plan provided there are no complications. This refers to a short period after diagnosis during which the pancreas still produces some insulin, making blood glucose levels easier to control. However, this phase is temporary. As the remaining beta cells stop functioning, diabetes management becomes significantly more intensive. For families, this honeymoon period can be misleading. They may think the

condition is improving or even question the diagnosis. It's a brief window of relative stability before the full demands of T1D management set in, making this a critical time for education, emotional support, and clear guidance.

Phase 3: Adjustment

In this phase, the patient is introduced to treatment plans that can be tailored to their physical condition and, where possible, aligned with their lifestyle and daily habits. This process is led primarily through in-person consultations with the internist and supported by other members of the primary care team such as the diabetes nurse, dietitian, or technical nurse via a mix of in-person meetings, phone calls, or emails.

However, all these communication channels are limited by scheduled appointments, standard working hours, and delayed response times particularly with emails, which often take up to five working days for a reply. As a result, patients and their families frequently turn to alternative sources to fill information gaps. They may search online for guidance, consult forums or social media, or even contact pharmaceutical companies directly typically through email or social platforms especially if the inquiry relates to medication or device usage.

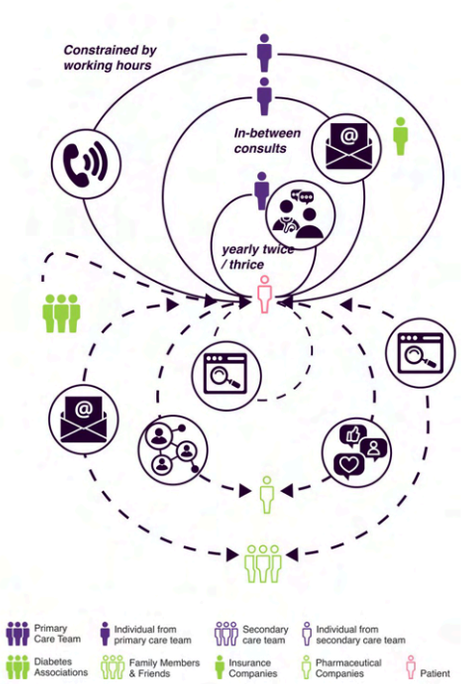


Figure 4.21: Phase 3 Adjustment Stakeholder Mapping

If the patient or their family has already connected with a diabetes patient association, they may also seek advice or shared experiences related to prescribed treatments. At the same time, ongoing communication with insurance providers continues via emails and phone calls as patients attempt to clarify treatment coverage, reimbursement, and other administrative concerns.

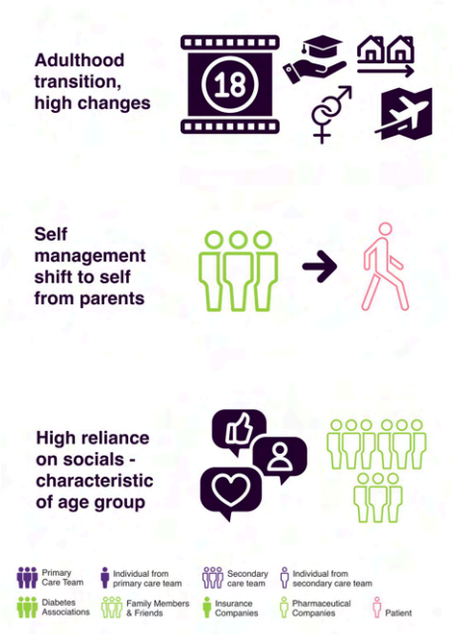


Figure 4.22: Phase 4 Transition Stakeholder Mapping

Phase 4: Transition

This phase applies specifically to patients who were diagnosed with Type 1 Diabetes (T1D) during childhood or adolescence under the age of 18. While in pediatric care, disease management is largely a collaborative effort between the healthcare team and the patient's family. However, upon turning 18, the responsibility shifts entirely to the patient. Parents are no longer required to attend medical appointments, and the young adult is now expected to take full ownership of managing their condition.

This transition often coincides with significant life changes: moving out for higher education, graduating from high school, traveling independently, or becoming sexually active. These developmental milestones, combined with identity formation and emotional fluctuations typical of this age, can significantly affect how well the patient adheres to their care plan.

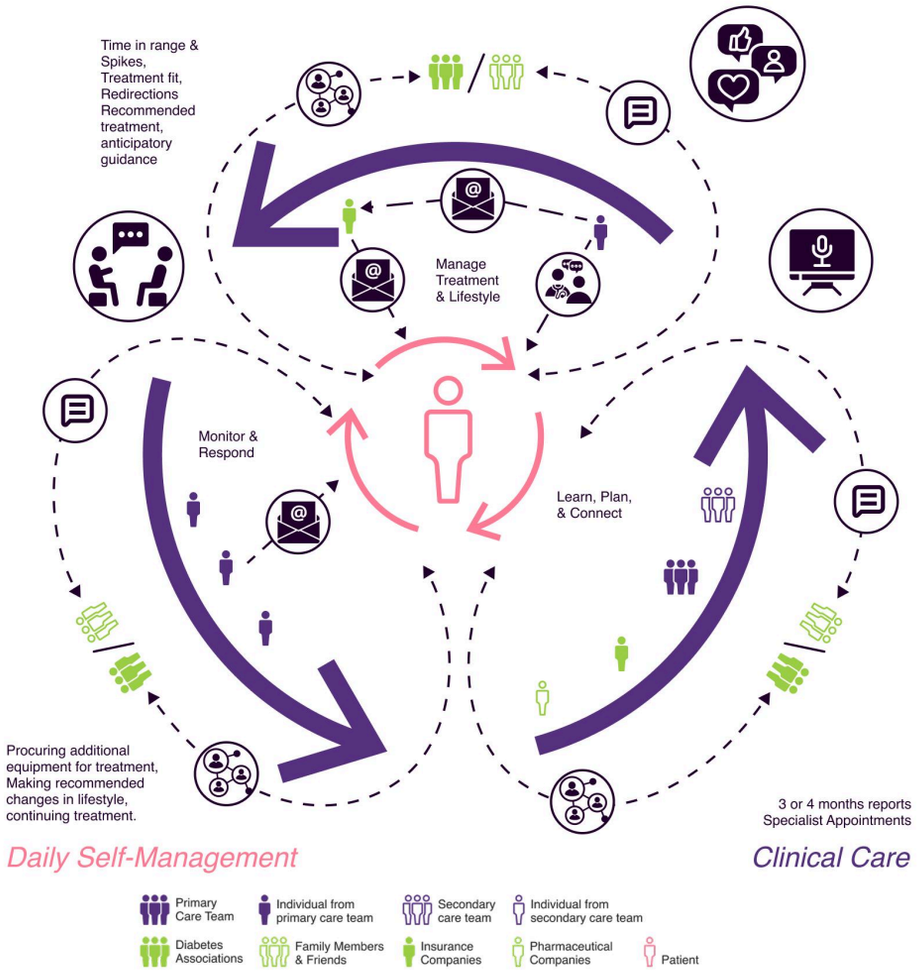


Figure 4.23: Phase 5, Integrated Care Management Stakeholder Mapping

Social media becomes a major source of influence, not only for health information but also for self-image and peer comparisons. This reliance, paired with a reluctance to openly discuss personal issues or emotional well-being with healthcare providers often due to stigma surrounding T1D can lead to decreased engagement with recommended care.

Compounding the challenge is a noticeable reduction in consultation time with healthcare providers, often limited to just 10-15 minutes. This time constraint further limits meaningful dialogue, especially around non-clinical but impactful issues, such as mental health, lifestyle changes, or emotional struggles.

Stakeholder & User Research

The care journey for people with T1D doesn't have a defined end point it instead continues in a cyclical, year-long loop. Typically, patients are allowed three hospital consultations per year, each lasting only 10 minutes.

These brief appointments primarily focus on reviewing glucose data particularly "time in range" metrics. Patients are often confronted with their blood sugar highs and lows, but due to time constraints, there's little opportunity to discuss underlying causes, life events, or emotional challenges related to these fluctuations.

Many patients find this model unhelpful. They feel healthcare providers lack adequate context about their personal lives and would prefer to spend some of the consultation discussing future plans or upcoming life events such as travel, social changes, or work shifts and how to manage T1D in those situations. This reveals a clear friction between the reactive approach of most healthcare professionals (focused on past data) and the anticipatory, forward-looking guidance patients are seeking.

Integrated Care Management: Sub-Phases

Sub-phase 1: Monitor & Respond

This phase takes place between in-person consultations. The patient continues self-managing the condition as prescribed but may encounter questions related to small lifestyle changes or equipment needs. Communication with healthcare providers typically occurs via email, though response times can vary. If the situation requires, a hospital visit may be recommended. During this time, patients often rely on unofficial channels such as friends, family, or patient organizations for quick advice or experiential support.

Sub-phase 2: Learn, Plan & Connect

In this sub-phase, patients proactively seek out stories, experiences, and lifestyle tips from others living with T1D. This commonly happens through social media platforms like Instagram, podcasts, blogs, or patient support networks. These informal, peer-driven resources provide valuable experiential knowledge. However, they often exist outside the formal healthcare system, and healthcare providers typically have little visibility into this layer of patient behavior. This raises a key question: should hospitals and HCPs play a more active role in curating or integrating such patient-experience content, given that it reflects evolving needs and trends in the patient community?

Sub-phase 3: Manage Treatment & Lifestyle

Although a treatment plan may have already been established during earlier phases, it often needs to be adapted over time due to factors like comorbidities, new technologies, life events (e.g., pregnancy), or major lifestyle changes. This reactivates communication with healthcare providers and insurance companies. Established networks such as patient associations or personal contacts often become vital once again, whether for practical advice, emotional support, or simply quick peer input. In such cases, the standard 10-minute consultation often proves inadequate. Patients require anticipatory guidance, and healthcare providers need timely access to up-to-date data and reports to give meaningful advice.

Conclusions

The T1D management journey is deeply personal, nonlinear, and influenced by a mix of medical, social, and emotional factors. Through multiple iterations of the journey map, it became clear that patients navigate a complex ecosystem of formal healthcare and informal support systems both essential to how they manage chronic care. Unlike the clinical pathway, patients experience distinct emotional and behavioral phases that go beyond what is being traditionally captured by healthcare systems.

The journey can be segmented into five key phases Diagnosis, Onboarding, Adjustment, Transition (if applicable), and an ongoing Integrated Care Management loop. Each phase presents unique challenges in communication, decision making, and access to credible information. A common thread is the patient's strong desire to adapt T1D to fit into their lifestyle, rather than reshaping their life around the condition.

Notably, gaps exist between what healthcare professionals prioritize during clinical interactions and what patients need particularly around anticipatory guidance, personal context, and emotional support. **The reliance on non-clinical information channels such as social media and peer networks highlights both a need and opportunity: integrating experiential learning and patient voice into care delivery to create a more holistic, forward-looking approach.**

4.2

Patient journey + Information flow map

Goal: To compile insights so far into patient journey map and understand the emotional, and informational gaps in the Type 1 Diabetes (T1D) patient care journey across life stages, with the aim of improving leefmaatje's delivery of personalized, timely, and empathetic care that aligns with real-life events and patient readiness.

4.2.1 Life events

There are just so many things happening parallelly to T1D in a patient's life which at times have large impact or small impact on the ability to manage T1D. The circle show events highlighting the impact/disruption in the T1D management. For example, the walking a dog may not impact on the patient as much as practicing intensive sports or being sexually active or starting menstruation which in comparison are less impactful as being pregnant and going through it. At the same time another highlights in relation to life events that came up was threshold of asking HCP's certain question for example menstruation question especially with a male Internist the patient expressed high threshold. Also, when teens become sexually active, they expressed discomfort in asking question about it in presence of parent when in minor care. Both the events discussed above definitely have an impact on how one manages their condition and if not addressed properly it may set up tone for consultation and reaching out to HCPs. And this gap would thus increase as time passes.

4.2.2 Patient experience and Gaps phase wise:

Phase 1: Diagnosis

In this phase, patient experiences are often marked by shock, fear, and confusion. Many patients and families encounter Type 1 Diabetes through a crisis event, commonly fainting and then waking up in an ER setting. This abrupt, high stress entry into the healthcare system leaves patients disoriented and unprepared for the journey ahead.

Negative Experiences

- *"I did not understand what happened! I closed my eyes and next I know I was in ER."*
- *"It felt like the doctor was telling me a horror story."*
- *"My life changed… it felt like I lost my freedom to live, I was handed over rules to stay alive."*

Positive Experiences

- *"They made space for our questions."*
- *"My internist was more interested in what makes me click… I liked her approach."*
- *"I'm grateful that we as a family were able to take part in this condition management."*

Identified Gaps

Several systemic and emotional gaps were identified in this phase. First, information was often delivered in a **fear-based and overly clinical manner, which heightened patient anxiety** instead of offering reassurance. There was also a clear emotional support deficit, with little to no psychological help offered during a moment of crisis. Many patients and families were overwhelmed by a flood of generic information, which they struggled to process or apply to their own lives. Finally, there was a lack of a soft transition from emergency care to long-term management, leaving patients feeling unsupported and unprepared for the road ahead.

Phase 2: Onboarding

In the onboarding phase, patients meet their full care team and are introduced to the basics of T1D management. While some patients feel supported and valued, many are overwhelmed by the volume and generality of information. Parents with minors with T1D often feel unprepared in their new caregiving roles, and emotional or peer support is typically missing.

Negative Experiences

- *"It was like a firehose of rules. We left more confused than when we came in."*
- *"They assumed one info session was enough. It wasn't."*
- *"I felt sometimes… like I did not know what to expect."*

Positive Experiences

- *"I am able to gradually learn the basics of carb counting and CGMs… soon it will come naturally."*
- *"There is more to life than just T1D and my HCP understands this."*
- *"Everyone is so involved… the support is good."*

Identified Gaps

Education for patients and families is often delivered as a **one-size-fits-all approach, failing to adapt to individual factors** such as age, lifestyle, or readiness. There is little to no phased or ongoing learning support, leaving families without the guidance needed as their journey evolves. Parents, in particular, frequently feel unsupported and uncertain about their role in managing the condition. Additionally, there is a lack of early opportunities to connect with peers or mentors who could provide valuable guidance and shared experiences. As a result, **many emotional and technical questions go unanswered, creating gaps in both understanding and confidence.**

Phase 3: Adjustment

The adjustment phase is where patients start integrating T1D management into their daily lives. While some find empowerment through personal learning and networks, many face bureaucratic, emotional, and logistical barriers.

Negative Experiences

- *"I get questions out of stress in the middle of the night and I can't reach hospital."*
- *"I don't feel comfortable discussing menstruation or sex in consults."*
- *"If something isn't working, I have to wait until it fails to prove it's broken."*

Positive Experiences

- *"The association really helped me and I feel supported."*
- *"Docs call this honeymoon period… but I think it is easy cause right now."*
- *"My HCPs understand there's more to life than just T1D."*

Identified Gaps

Several structural and emotional gaps became evident in this phase. Bureaucratic hurdles often delayed access to essential technologies like CGMs and pumps, limiting patients' ability to manage their condition effectively. Emotional concerns, such as the fear of nighttime hypoglycemia, were frequently left unaddressed. **A lack of proactive communication from care teams made patients feel isolated** and solely responsible for their management. **Shame and judgment around "bad numbers" discouraged open dialogue.** There were also no formal pathways to connect with supportive communities, leading many patients to rely on informal, and sometimes unreliable, sources like the internet or peer groups for information and emotional support.

Phase 4: Transition

This phase marks the handover of responsibility from parents to patients, often around age 18. While some feel empowered by increased autonomy, others feel burdened and unprepared for navigating adulthood with T1D. The absence of an intermediate, guided shift in care and emotional validation can make the transition emotionally and logistically difficult.

Negative Experiences

- *"There's so many changes in my life… do I have to also manage T1D on my own?"*
- *"I don't understand how to navigate the insurance and coverage… it was so easy before."*
- *"Right now it's more about surviving the day than planning for the future."*

Positive Experiences

- *"I can now talk about private matters with my doctor without feeling awkward."*
- *"The transition was smooth from pediatric to adult care… I felt well supported."*
- *"I get to take charge of how I want to manage my life!"*

Identified Gaps

Key gaps emerged around the lack of structured support during this critical handoff. Transitions were often either too abrupt—forcing sudden independence—or too delayed, reinforcing dependence. Adolescents frequently felt unprepared, and many avoided disclosing struggles out of fear of being judged or blamed. Furthermore, **emotional challenges unique to adolescence—such as identity development, peer pressure, and changing relationships—were often overlooked or minimized, leaving teens feeling unsupported during a vulnerable period.**

Phase 5: Integrated Care Management

In long term care, many patients develop stable routines and personal networks outside the hospital system. However, care often becomes reactive and fragmented, with brief appointments and minimal acknowledgment of life changes or mental health needs. While some patients appreciate the independence, others feel burdened by the constant cognitive load and reliance on unofficial resources for anticipatory or experiential knowledge.

Negative Experiences

- *"I just see my doctor thrice a year for 10 mins… it's the same thing every time."*
- *"I don't feel prepared like before… I'd like anticipatory guidance."*
- *"I sometimes learn about treatments from peers before HCPs, which makes me suspicious."*

Positive Experiences

- *"Burnout used to scare me… now it's something I can talk about and get support for."*
- *"I eventually figure things out through my network when HCPs aren't available."*
- *"They helped me fine tune my loop setup with me, not for me."*

Living with Type 1 Diabetes: The Role of Information in Care & Self-Management

Understanding how the need for specific information evolves with life events and care transitions.

STAGES

01 DIAGNOSIS

Usually triggered by life-threatening episode. Care focus is immediate stabilization, blood tests, confirming T1D. Involved stakeholders emergency staff, internist, and overwhelmed family members.

02 ONBOARDING

Initial phase of education during the "honeymoon period," when residual insulin production creates a false sense of ease. Focus is on delivering intensive, multidisciplinary information on treatment, diet, devices, and emotional support.

03 ADJUSTMENT

Adjusting treatment plans with regards to insulin management as well as diet. Care focus is Tailoring care to lifestyle and refining insulin routines and device usage.

04 TRANSITION

Shifting responsibility from parent-supported pediatric care to independent self-management in adult care. Only Applicable to minors diagnosed with T1D.

05 INTEGRATED CARE MANAGEMENT

Long-term self-management with periodic professional check-ins, increasingly shaped by life context. This phase can be seen in 3 phases as follows,

MONITOR & RESPOND

Patients handle day-to-day issues between visits.

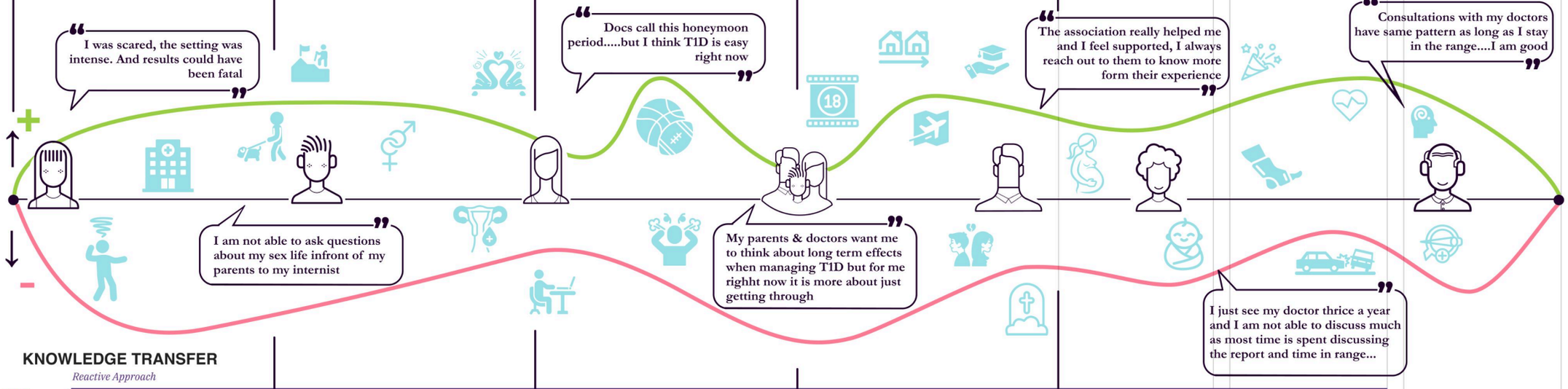
LEARN, PLAN & CONNECT

Proactive learning from peer stories and content found.

MANAGE TREATMENT & LIFESTYLE

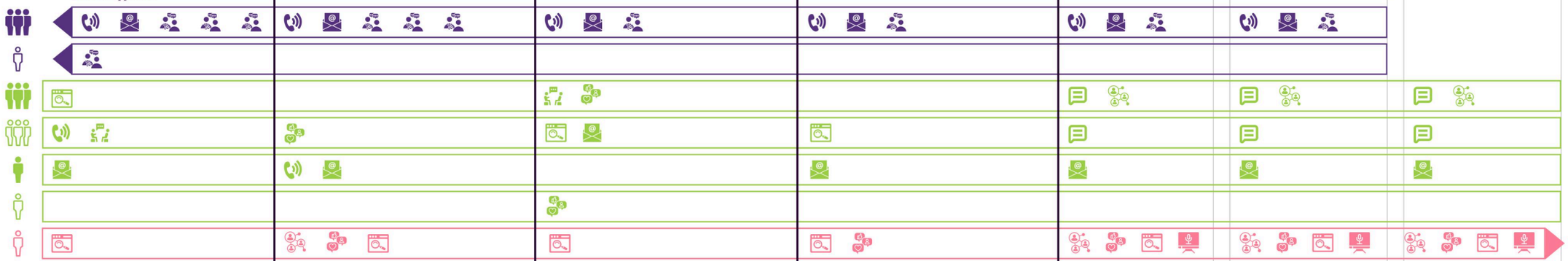
Re-engagement with providers and insurers due to life changes or new treatments.

PATIENT EXPERIENCE



KNOWLEDGE TRANSFER

Reactive Approach



Proactive Approach

GAPS

- Fear-based communication without emotional support
- Information overload with little time to process
- Generic, non-personalized education
- Crisis/ICU-based care entry without smooth follow-up or transition

- Educational materials are one-size-fits-all; not tailored to age or lifestyle
- Parents left unsupported in their new caregiving roles
- Lack of early access to peer or mentor support
- Technical & emotional questions unanswered

- Bureaucratic hurdles to accessing CGMs, pumps.
- Nighttime hypo anxiety often overlooked
- Little to no proactive outreach or follow-up from care teams
- Shame and fear around "bad numbers" left unaddressed
- Patients turn to Google due to inaccessible care

- No in-between space for shared responsibility (teens/parents)
- Patients hide issues out of fear of being blamed
- Teen-specific emotional struggles dismissed

- Emotional support and learning often come from peer stories and online sources
- Patients seek connection and validation outside the clinic due to lack of structured support

- Overreliance on patients to "prove failure" to access tools and technologies
- Appointments are too short to address major life changes or emotional shifts

- Reactive vs. proactive care leaves patients to manage crises alone
- Patients feel like isolated decision-makers, carrying the full cognitive load

Primary Care Team · Individual from primary care team · Secondary care team · Individual from secondary care team · Diabetes Associations · Family Members & Friends · Insurance Companies · Pharmaceutical Companies · Patient

← *Figure 4.24: Patient Journey & Information flow map for T1D*

Identified Gaps

Several persistent gaps hinder effective long-term care. Appointments were described as short and repetitive, often focused solely on past numbers rather than proactive planning or life context. Mental health and burnout, though frequently experienced, remained poorly integrated into routine care. Access to advanced tools like pumps or automated systems was typically reactive—only offered after a patient experienced failure. Patients were left to carry the full cognitive and emotional burden of decision-making, often without structured guidance. Although many relied on informal resources like podcasts or community groups for insights, these sources were rarely acknowledged or validated by healthcare professionals. Additionally, patients felt that DIY solutions or lived experience were sometimes dismissed, creating a disconnect between formal care and real-life management.

Conclusions

At the end of the day everything comes down to **if patient has trusted and reliable information they need to feel empowered to mange their chronic condition**. There are going to points of stresses as a result of the condition and it is part and parcel of T1D, but what care can at least provide is a channel through which they have access to this trusted and reliable information. And secondly if possible help them psychologically as it has been identified that it also strains them emotionally.

Currently hospitals are seen as reliable and trusted sources of information. **They already have multiple existing channels of information sharing with patients and this with addition of multidisciplinary team makes it difficult to manage queries.**

Life with T1D is dynamic, not linear: **Patients are not only navigating a chronic condition but doing so alongside major life transitions puberty, school, relationships, sex, career, pregnancy, etc. each influencing their ability to manage T1D.** Yet the care system treats T1D in a silo, rarely accounting for these real-life overlaps.

Information delivery is misaligned with readiness and relevance: Across almost every phase, patients report feeling overwhelmed or underserved too much generic info too soon, or critical info (e.g. menstruation, sex, burnout) delivered too late or not at all. This shows a need for phased, contextual, and personalized education.

Emotional and peer support is under prioritized: Despite the deep psychological burden of T1D, emotional support is often informal, delayed, or missing entirely. Patients consistently express that peer networks, empathy, and non-clinical check ins improve trust and resilience more than formal metrics alone.

The care system is reactive and fragmented: **Proactive planning is rare**; support is often only provided after problems escalate (“prove failure to get help”). Long term management becomes repetitive and stagnant, leading patients to look elsewhere for knowledge, risking misinformation and loss of faith in healthcare providers.

Teens and transitions are high risk points: The transition from paediatric to adult care is a flashpoint where many patients feel unsupported. Lack of shared decision making during this handover often leads to disengagement or shame driven secrecy.

4.3

Value Exchange Mapping

Goal: To identify and map the value exchanges between key stakeholders in the healthcare ecosystem by analyzing stakeholder interviews and conducting iterative mapping sessions at HIL, with the aim of understanding how interactions occur across individuals and institutions and uncovering opportunities to improve collaboration and information flow.

4.3.1 Stakeholder Overview and Mapping Structure

The stakeholder map for Leefmaatje highlights all key actors involved, illustrating their interactions and categorizing them into upstream (paying customers and end users), downstream (suppliers and subcontractors), external (community members and affected individuals or groups), internal (project sponsor and delivery team), and neutral stakeholders. The map also identifies critical information hotspots and reveals that some stakeholders may occupy multiple roles depending on their involvement in care delivery, data flow, and self-management support.

Internal Stakeholders: Institutions and Providers

Internal stakeholders include care institutions and healthcare providers. Hospitals serve as the primary care hubs, offering trusted, research-driven information and services through healthcare professionals (HCPs) like doctors, nurses, and educators. Radboud, a tertiary academic hospital, plays a central role by linking hospitals, technology developers, eHealth platforms, and other external stakeholders. It also supports innovation through its IT and business experts. Broader healthcare providers directly interact with patients, influence internal hospital policy, and collaborate with clinics. Clinics focus on primary and secondary care and maintain ties with tertiary institutions like Radboud.

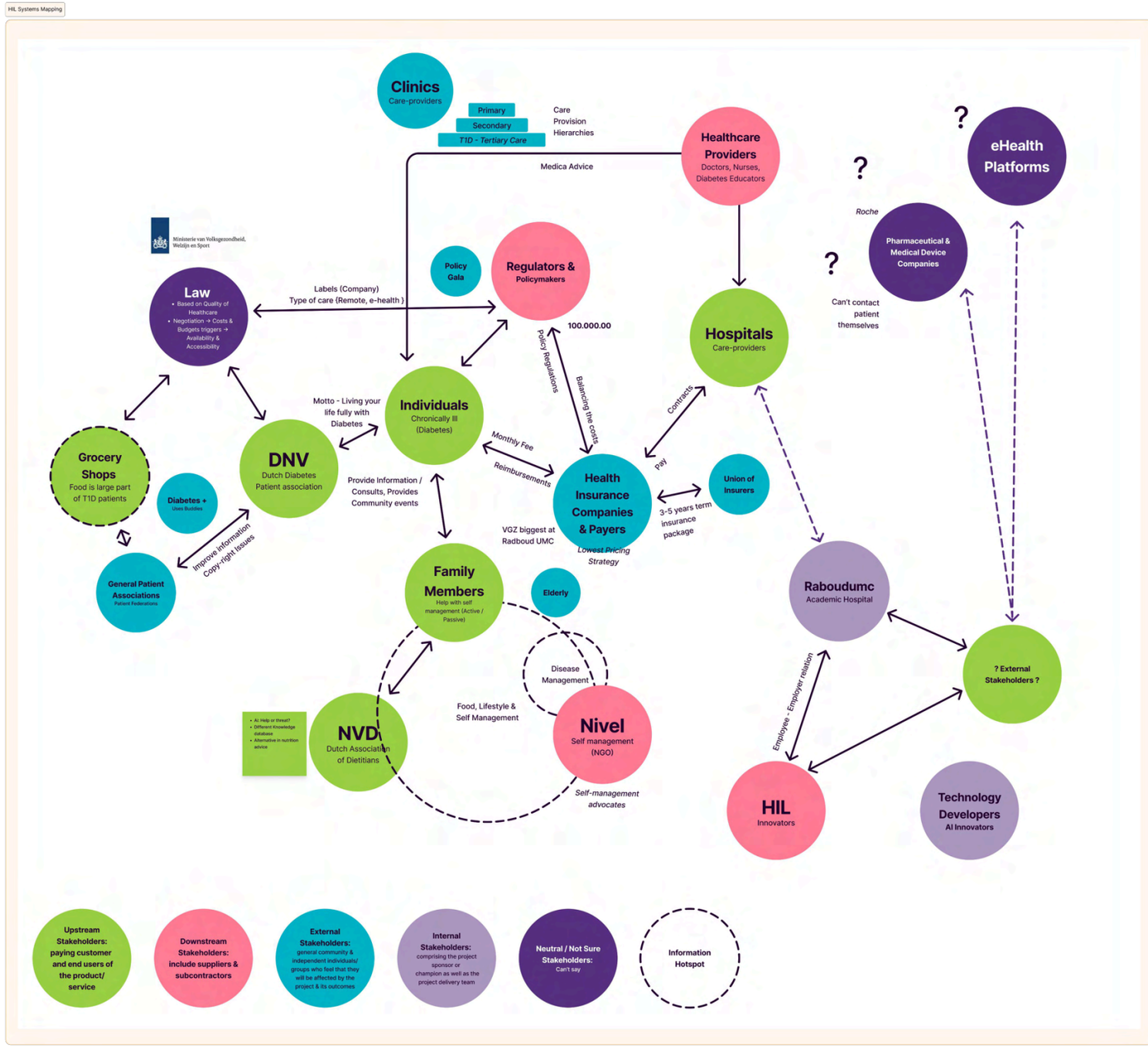
Upstream Stakeholders: End Users and Customers

Upstream stakeholders include individuals living with Type 1 Diabetes (T1D), who are the primary users of Leefmaatje and associated services. These patients receive care, education, and technology based on prescribed treatments, funded largely through insurance. Family members are also key players in care and financial support. The Dutch Diabetes Association (DVN) bridges patients and the system by offering education, influencing policy, and providing feedback to institutions, all funded through patient subscriptions. The Dutch Dietitian Association (NVD) supports dietary guidance crucial for managing T1D. Grocery shops, while not part of formal healthcare, indirectly support care by offering lifestyle-supportive food options.

Downstream Stakeholders: Payers, Policy, and Innovation

Downstream stakeholders encompass regulatory bodies, insurers, and innovation partners. Regulatory and policy agencies shape healthcare legislation, data privacy (e.g., GDPR), and reimbursement structures, directly impacting how care is delivered and financed. Insurance companies act as financial gatekeepers, determining access to tools and services through funding packages. Innovators such as HIL partner with institutions like RadboudUMC to develop new technologies. NGOs like Nivel focus on empowering patients through self-management strategies and disease education.

Figure 4.25: Stakeholder value exchange map, T1D, Radboudumc



Neutral Stakeholders: Unclear Influence and Roles

Neutral stakeholders are currently under-defined in their influence or contribution to the system. eHealth platforms play roles in data integration, remote care, and education, but their accountability and value exchange mechanisms are not well understood. Pharmaceutical and medical device companies supply essential tools such as insulin pumps and CGMs, yet their involvement in decision-making processes remains opaque. Technology developers contribute to software and tool development but may function outside the formal care structure.

External Stakeholders: Frameworks and Lifestyle Support

External stakeholders include legal entities such as the Ministry of Health and those enforcing GDPR and reimbursement policies. These bodies define the legal and procedural boundaries of care delivery. Grocery retailers and general patient associations also support day-to-day lifestyle needs, offering nutritional support outside clinical environments. While not traditional healthcare actors, they influence patient wellbeing and self-management in meaningful ways.

4.3.2 Key Value Exchanges and Information Flows

The map visualizes critical value exchanges across stakeholders. Data and advice circulate among hospitals, healthcare professionals, patients, and families. Patient associations also contribute to this loop. Hospitals and clinics provide direct care, while regulators influence insurers and care policies. Insurers, in turn, affect what care is reimbursed, influencing patient access to tools like CGMs. Educational content is disseminated through DVN, NVD, HCPs, and informal networks, creating a complex information web.

Centralized Control and Systemic Tensions

Although patients are positioned at the center of the stakeholder map, decision-making authority and data control largely remain with hospitals, insurers, and regulatory bodies. T1D management, falling under tertiary care, introduces complexity, especially given Radboud's dual role in academic research and care delivery. These factors can limit patient empowerment and hinder consistent self-management. The mapping process reveals multiple stakeholder roles and value exchanges, prompting further exploration of their responsibilities and potential impact.

Conclusion: Integrating Leefmaatje Within the Ecosystem

The stakeholder and value exchange mapping for T1D care demonstrates a deeply interconnected system. Hospitals, clinics, and healthcare professionals act as structured, reliable sources of care and information. Organizations like DVN play unique bridging roles, providing patient-focused services while also feeding insights back into the system. Funded by patients rather than insurers, DVN operates more flexibly and with fewer institutional constraints.

Healthcare professionals control individual care delivery, while broader systemic design lies with hospital administration. Insurers manage large datasets and reimbursement decisions and could potentially offer more comprehensive support if not limited by regulatory constraints.

Other stakeholders such as legal bodies, tech developers, and retailers can enhance care through innovations like Leefmaatje. However, without proper integration into existing structures, these services risk being underutilized. As such, **DVN, hospitals, and insurers emerge as the most suitable stakeholders to champion Leefmaatje's implementation.** These entities already manage patient data and provide trusted guidance, allowing Leefmaatje to function as a complementary tool that bridges existing information gaps and promotes continuous, patient-centered care.

Patient Journey & Value Exchange Maps

3 different type of informational support highlighted are contextual information, experiential information and lifestyle adaptation information.

Patient Journey Mapping

Patients use mix of official care and social channels to meet their different informational needs, which leaves them partially supported.

Patient Journey Mapping

There is friction observed in HCP's reactive approach and patients proactive approach highlighting a communication gap.

Patient Journey Mapping

There is saturation of different channels for T1D information and experiential information.

Patient Journey Mapping

There is no end to T1D care journey it's last stage is integrated self management loop requiring both the patient and multidisciplinary team of HCP's to co-manage the condition.

Patient Journey Mapping

Insurance providers have emerged as potential stakeholders and could serve as viable product owners for Leefmaatje, in addition to hospitals and patient associations.

Value Exchange Mapping

Fear-based and overly clinical manner guidance, heightens patient anxiety.

Patient Journey Mapping

Other external stakeholders such as legal bodies, tech developers, and retailers, may also be considered as potential product owners. However, these external stakeholders are positioned further from the healthcare delivery ecosystem, which may limit their ability to deliver patient-centered value and long-term integration.

Value Exchange Mapping

AI / Tech Business Health

Chapter 05: New Worlds Building

Formulating Strategic Directions

In this chapter

Background Image | *Snapshots of different ideas from Wekerom creative facilitation workshops*

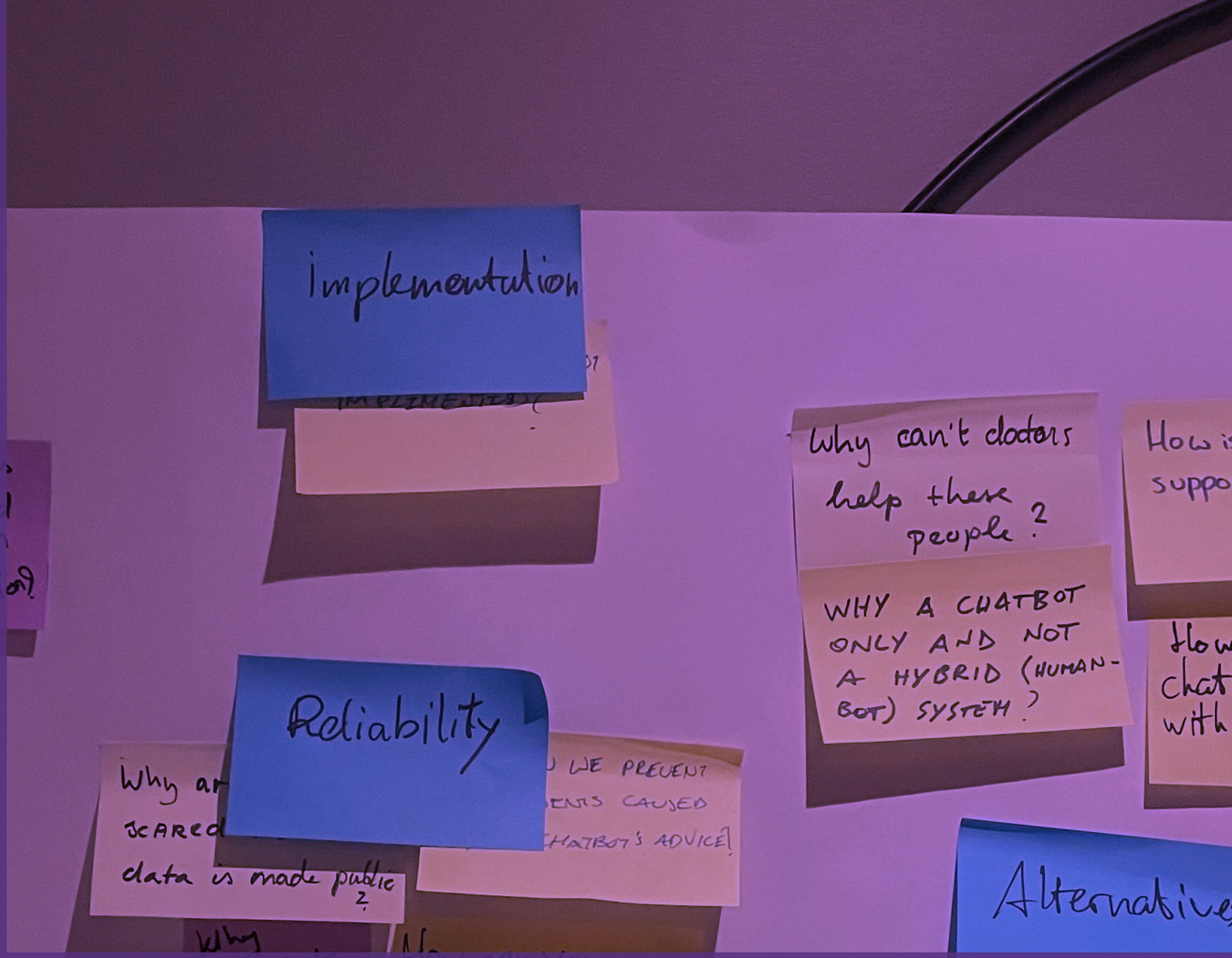
Define

Research

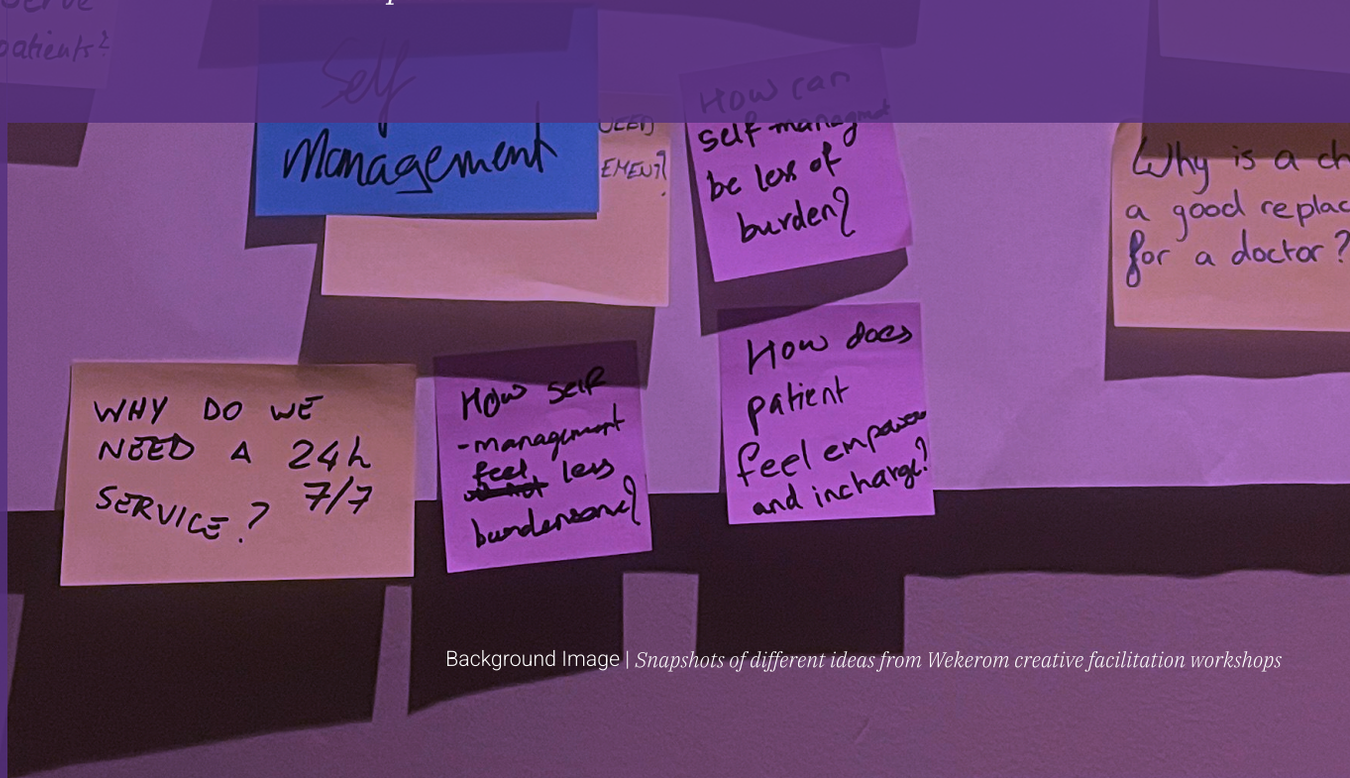
Synthesis

Design

Test



This chapter summarizes preliminary research conducted in the early design phase. It defines key concepts, outlines chatbot requirements and success factors, and provides a baseline assessment of the Leefmaatje service. A comparative review of digital healthcare services examines their integration and insurance backing. Expert interviews offer multidisciplinary insights into the viability and system-level implications of chatbot adoption.



Background Image | *Snapshots of different ideas from Wekerom creative facilitation workshops*

5.1

Creative Facilitation Workshops

Goal: The primary objective of this creative facilitation sessions was to explore and generate innovative ideas for implementing a self-management chatbot for Type 1 Diabetes patients, considering the current pressure on the healthcare system and the limited consultation opportunities. These workshops were organized by Simone van der Velde and Teije Nolen in parallel in wekerom as a part of Creative facilitation course (A course I myself dide a year before) and I participated as Problem Owner.

5.1.1 Details About the Workshops

Workshop Format

Both facilitators conducted workshops using the Integrated Creative Problem Solving (iCPS) framework, which includes:

1. Problem Finding
2. Idea Finding
3. Solution Finding

Simone van der Velde's Session

Problem as Given (PaG)
"How can a self-management chatbot be implemented—within or outside the healthcare system—to effectively support Type 1 diabetes patients in a system under pressure?"

Problem as Perceived (PaP)
"How to make the hospitals see the value of self-management chatbots for Diabetes Type 1 patients?"

Simone's group (G1) interpreted the problem as what value can such chatbot self-management services for patient offer to the hospital. Which was very interesting reframing.

Teije Nolen's Session

Problem as Given (PaG)
"How can a chatbot be effectively implemented to support Type 1 diabetes patients in their self-management while ensuring reliability, accessibility, and flexibility?"

Problem as Perceived (PaP)
"How to stimulate diabetes type 1 patients to use a self-management tool?"

Teije's Group (G2) interpreted problem as given as how to encourage patients to use such tools. What values would self management tools can offer to the patients.

The goal is to ideate on value propositioning with one group for hospitals and for patients with other group. In order to get new perspectives on he given problem. Also having different focuses in the 2 workshop helped simplify the complexity of focusing on two different stakeholders.

- Kalyani (Problem Owner)

5.1.2 Key Outputs from the Workshops

G1: Value for the hospitals

The session focus was broadened to to create a range of ideas on values for the thesis and also account what can be risks associated. Further these ideas were evaluated with hit's and dot's method to identify the ideas that G2 saw were the best value for hospitals.

Figure 5.26: Clustered ideas with HITS and DOTS marked by G1

Key Insights

From the six idea clusters marked with purple post-its, the following ideas were taken forward for further development:

Efficiency & Time Optimization
The chatbot can act as a first filter, prioritizing in-person consultations for more complex cases and reducing routine interactions. This supports more efficient use of doctor time and aligns with the idea that reduced consultation time leads to cost savings.

Reduced Consultation Load
By helping more people in less time and shortening waiting periods, the chatbot can reduce appointment backlogs and contribute to better resource allocation.

Strategic Branding & Positioning
Ideas like becoming the first hospital to implement the chatbot, ranking higher in service quality, and positioning as pioneers of future healthcare portray the chatbot as a tool for innovation and institutional leadership.

Data-Driven Quality Improvement
The chatbot enables the collection of valuable data that can be used for clinical research, internal improvement, and exploring potential revenue streams through insights derived from patient interactions.

G2: Value for the T1D patients

This group relooked as service from the point of view does it have to be a chatbot if the goal is to just “educate” the T1D patients. Essentially seeing at self-management an education activity. Many ideas were explored and were then organized in a C-Box from common / original point of view against easy to hard to implement point of view. Followed by hits and dots to identify personally liked best ideas by the G2.

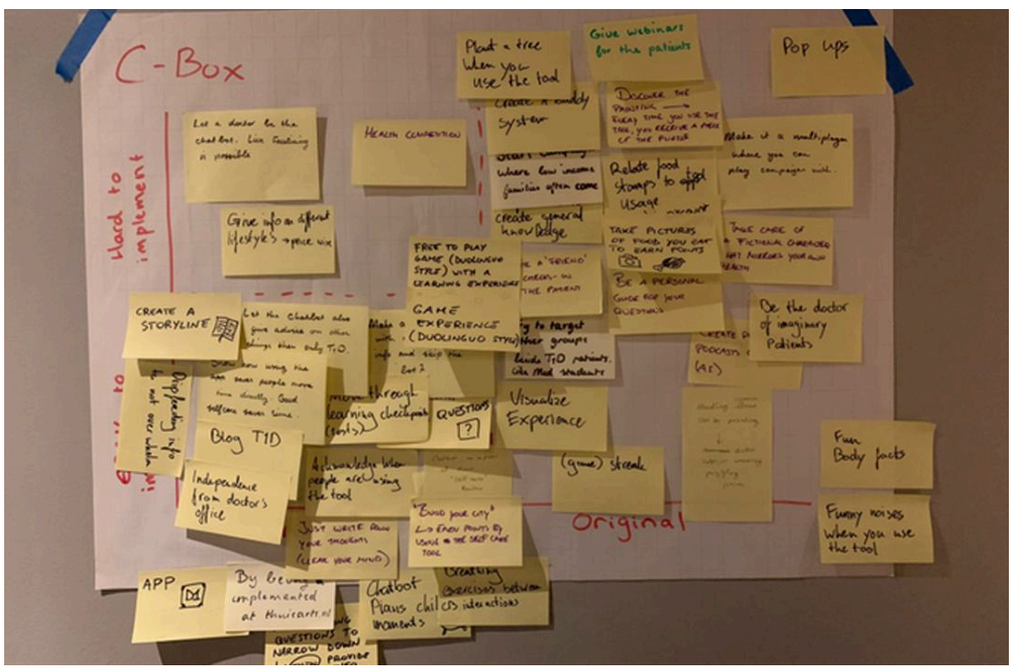


Figure 5.27: C-Box’ed ideas categorized by G2

Figure 5.28: Early themes observed.

Key Insights

Interesting ideas ranging from the bot as Duo-lingo App catering to the T1D patients; to Bot as a mascot as an integration for Radboud were discussed extending services to all patient groups (Figure:). The sticky notes reflect various ideas, benefits, and user needs, clustered thematically Figure as follows:

Empowerment & Patient Autonomy

The group emphasizes the importance of giving patients control over their health decisions. Notes such as “make your own decisions,” “validate your thoughts,” and “let people stay afloat above a sea of info” suggest a strong desire for tools that empower users to manage their condition independently. The chatbot is envisioned as a supportive tool that guides rather than dictates, allowing patients to feel more confident and self-reliant in handling their diabetes.

Education & Ongoing Learning

Several ideas reflect the value of continuous education. The chatbot is seen as a platform that encourages users to learn more about Type 1 Diabetes over time. Statements like “challenge patients to learn more” and “accumulate knowledge about diabetes” indicate a goal of turning self-management into a learning journey. The mention of conversation history also shows interest in features that allow users to revisit past interactions and build their understanding gradually.

Emotional Support & Psychological Comfort

The board reflects the emotional aspect of chronic disease management. Ideas such as “create a comfortable relation,” “fear of a patient,” and “bring comfort to talk about a problem” reveal that the chatbot could also function as a source of reassurance. Emotional safety and reducing anxiety are seen as critical values that the chatbot should support through tone, responsiveness, and presence.

Time & Cost Efficiency

Practical concerns around saving time and money are also addressed. The chatbot is perceived as a solution that can cut costs for both patients and healthcare providers. Notes like “save time,” “the doctor saves money,” and “free to use” underline the efficiency potential of integrating such a tool into patient care workflows, especially under healthcare systems under pressure.

Gamification & Motivation

The idea of making disease management more engaging through gamification stands out in this session. Concepts like “game = fun,” “increase in usage,” and “treating your disease like a game” suggest that the group sees playfulness and interactivity as key motivators. These features could help sustain user engagement, especially for younger or newly diagnosed patients who may feel overwhelmed.

Continuous Interaction & Social Connection

Lastly, the group highlights the importance of sustained interaction and potential community-building. Creating an ongoing relationship between the user and the chatbot is viewed as beneficial, as shown by phrases like “establish a constant interaction.” The idea of patient cooperation, compared to a blog, suggests an additional layer of peer-to-peer support that could be fostered through the platform.

Conclusion:

To explore the full potential of the leefmaatje like chatbot and uncover distinct value propositions, the ideation process was split across two focused workshops, one centered on hospitals and the other on T1D patients. This approach allowed for deeper insights and a clearer understanding of the needs of each stakeholder, helping to manage the complexity that arises when designing for two very different users.

For hospitals, the chatbot's value lies in its ability to drive operational efficiency and strategic innovation. **It can act as a first filter to prioritize clinical attention, reduce consultation load, and optimize time.** Additionally, it positions the hospital as a pioneer in digital health, while also enabling data-driven quality improvements and generating actionable insights from patient interactions.

For T1D patients, the chatbot delivers value by promoting empowerment, continuous learning, and emotional support. It enables self-management for their condition, offers ongoing education through **phased learning, and provides psychological comfort during emotionally charged transition moments.** Features that support social connection, personalization, and gamification further enhance user engagement, making diabetes management feel less clinical and more human-centered.

Overall, separating the workshops by stakeholder allowed for more tailored value propositioning, surfacing actionable ideas that are both realistic for implementation and meaningful to the end users.

> *For hospitals, the chatbot serves as a triage tool, helping prioritize clinical attention, reduce consultation load, and enhance operational efficiency.*

- Kalyani
(Value Proposition for Hospitals, key insight)

5.2

Strategic Directions

Goal: The aim is to consolidate insights gathered so far and define informed strategic directions for the implementation of Leefmaatje. Three potential product owners have been identified—hospitals, patient associations, and insurers. To support this, I further developed strategic directions by clustering key insights using value proposition canvases for each stakeholder.

5.2.1 Introduction

Chapters 3 and 4 outline three promising strategic directions for introducing Leefmaatje: hospitals, patient associations, and insurers. This chapter explores these directions through the lens of value propositioning to assess their strategic fit and implementation potential. For hospitals, two distinct models are under consideration: a standalone concept, which builds on the current vision of Leefmaatje as an independent digital tool for T1D, and an integrated concept, where Leefmaatje becomes part of existing care pathways. Patient associations are seen as emotionally resonant, patient-centered partners with a strong focus on education and advocacy making them well-positioned to offer Leefmaatje as a value-added service to their members. The insurance provider canvas was developed and refined through value exchange mapping workshops with Milou and Barend, focusing on how Leefmaatje could align with insurer priorities such as preventive care, cost-effectiveness, and customer engagement. ***Refer Appendix F for clear images of Value Proposition Canvases of the following concepts.***

5.2.2 Direction One: Leefmaatje Integration with Patient Associations

Looking at the stakeholder profile from page 54, patient associations primarily aim to support (T1D) patients in a human-centered and emotionally resonant manner. Their focus is on empowering patients in their self-care journey and, to a lesser extent, supporting caregivers. Associations often act as intermediaries between patients and hospitals amplifying patient voices and helping bridge systemic gaps in care and education.

A core pain point for these associations is the lack of personalized, behaviorally and emotionally nuanced support tools. They seek services that not only provide trustworthy information but also enhance their ability to differentiate themselves in a crowded landscape of patient support. Leefmaatje, if implemented well, becomes a strategic service add-on that can position the association as a digital innovation leader in patient advocacy.

From the value proposition canvas:

- Pain relievers include offering a low-cost, low-effort digital solution that integrates with existing platforms, reducing internal development burden.
- Gains include enabling the association to become more digitally progressive, strengthening partnerships with healthcare institutions, and potentially generating revenue through subscription-based models.
- Products/services include a chatbot-based digital health platform that delivers personalized, emotion-aware information and guidance to patients.
- Customer jobs align well: empowering patients, improving retention, sustaining financial viability through valuable services, and reinforcing the association's relevance.

- For patients, this integration means increased engagement, emotional support, and continuous learning, while for associations, it strengthens member relationships and enhances the overall perceived value of their offerings.

Thus, patient associations represent a scalable, mission-aligned, and mutually beneficial entry point for the introduction and adoption of Leefmaatje.

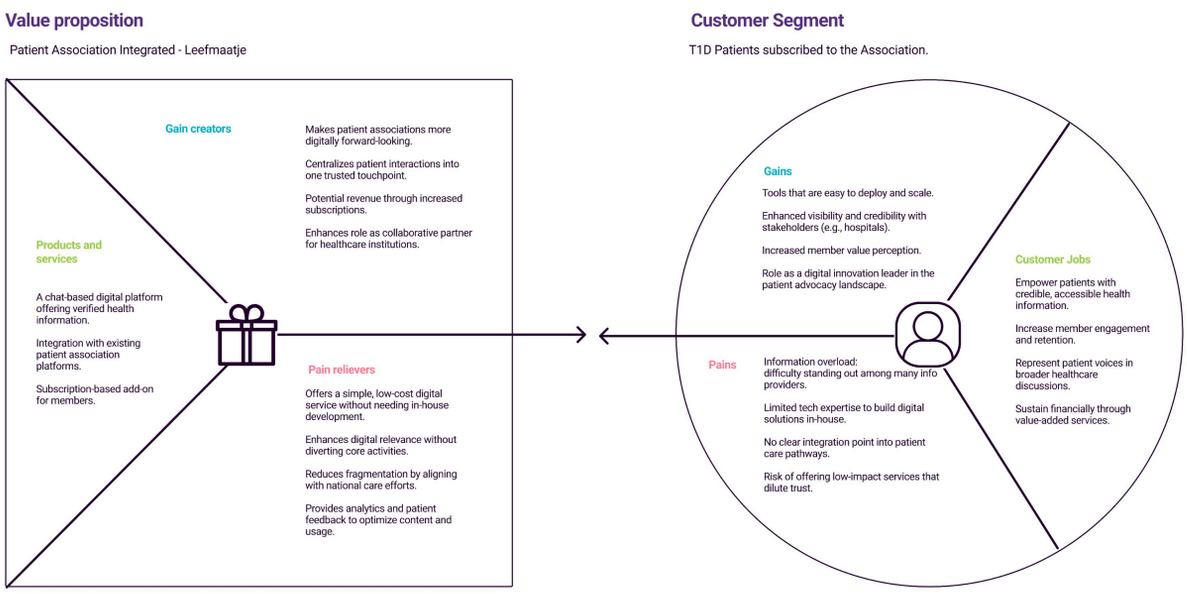


Figure 5.29: Value proposition canvas - Leefmaatje Integration with Patient Associations

5.2.3 Direction Two (2A): Leefmaatje integration with Hospitals

2A. Existing Channels & Triage: EHR, Holistic Hospital Linked Care System

Another promising direction is integrating Leefmaatje into hospitals via existing EHR systems (also described in Chapter 2, p. 42), as exemplified by the Radboud+ initiative a broader hospital digital platform. This concept sees Leefmaatje embedded within such hospital apps, making it a cross-condition tool available to a wide spectrum of patient groups, not just those with T1D.

In this model, Leefmaatje aligns with the efficiency-oriented value proposition of Radboud+, positioning itself as a digital triage and patient self-management solution. It becomes the first point of contact post-diagnosis, filtering low-complexity queries and providing behaviorally rich insights back to healthcare professionals. This triage capability not only helps reduce clinical workload but also strengthens patient adherence and care continuity.

Importantly, this integration supports seamless care pathways and leverages hospital-controlled privacy frameworks, enhancing both implementation feasibility and trust. Additionally, since services integrated into care pathways are more likely to be reimbursable under Dutch healthcare insurance policies, this concept may offer stronger economic viability. (Chapter 2, p. 42)

As discussed in Chapters 3 and 4, embedding Leefmaatje into formal care processes adds clear value not only for hospitals through digital transformation and data-driven decision-making, but also for patients and providers, who both benefit from more personalized, continuous care. This dual value proposition strengthens the potential for adoption at scale.

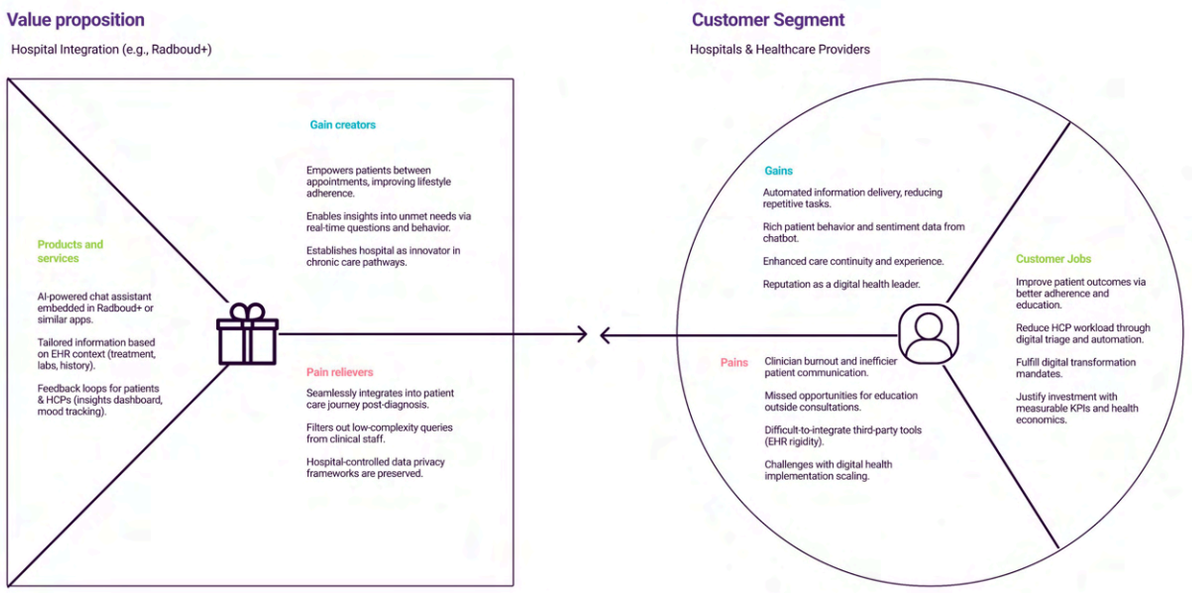


Figure 5.30: Value proposition canvas - Leefmaatje integration with Hospitals A

The Figure 5.30 outlines how integrating Leefmaatje into hospital systems (e.g., via Radboud+ or similar EHR-connected platforms) addresses key hospital needs.

Customer Segment: Hospitals & Healthcare Providers
Hospitals seek tools that:

- Improve patient outcomes through education and adherence,
- Reduce clinician workload using triage and automation,
- Fulfill digital transformation goals, and
- Support measurable health economics.

They face challenges like:

- Clinician burnout, inefficient communication,
- Missed educational moments outside appointments,
- Rigid EHR systems, and
- Scaling issues with third-party tech.

Value Proposition: Leefmaatje offers:

- An AI-powered assistant embedded in EHR-linked apps,
- Personalized insights and real-time behavioral data,
- Feedback loops for both patients and providers,
- Low-complexity query filtering,
- Seamless care pathway integration, and
- Compliance with hospital data governance.
-

Overall, the canvas emphasizes how Leefmaatje can act as a digital extension of care, boosting efficiency while enabling more proactive, personalized healthcare.

5.2.3 Direction Two (2B): Leefmaatje integration with Hospitals

Stand Alone: Patient Oriented Companion Bot

An alternative scenario is to position Leefmaatje as a standalone, direct-to-consumer companion app available independently via mobile app stores. This model taps into the unmet need for continuous, personalized, and emotionally intelligent support outside clinical contexts, especially during the many unsupervised moments of living with T1D. As explored in Chapter 2 (Pitch 34), Leefmaatje is envisioned as a digital life marshal, a personalized information delivery system that supports patients without replacing the clinical authority.

This model directly addresses key weaknesses previously identified in early concepts: namely, ambiguity around Leefmaatje's role, the personalization boundaries of its information, and its scope in relation to medical advice. By clearly positioning it as a companion, not a clinical advisor, the app gains room to support everyday life offering behavioral nudges, emotional encouragement, and contextual guidance rooted in patients' lived experiences rather than clinical records.

As highlighted in the stakeholder insights (Chapters 3 and 4, pp. 52–53), both patients and their family caregivers seek a 24/7, non-judgmental support system one that helps reduce stress, not amplify it. Parents especially valued a tool that avoids fear-based control and instead promotes empowerment and shared responsibility in diabetes management. For young patients in particular, Leefmaatje could serve as an always-there presence: helping them navigate emotional dips, lifestyle challenges, and routine care with dignity and independence.

From a healthcare provider perspective, a standalone Leefmaatje still holds value: by pre-answering recurring low-complexity queries, it may reduce consultation fatigue and allow clinicians to focus on deeper insights during appointments. While it exists outside formal EHR pathways, the model could still support the system by lightening provider burden and improving communication within multi-disciplinary teams particularly in pediatric care scenarios.

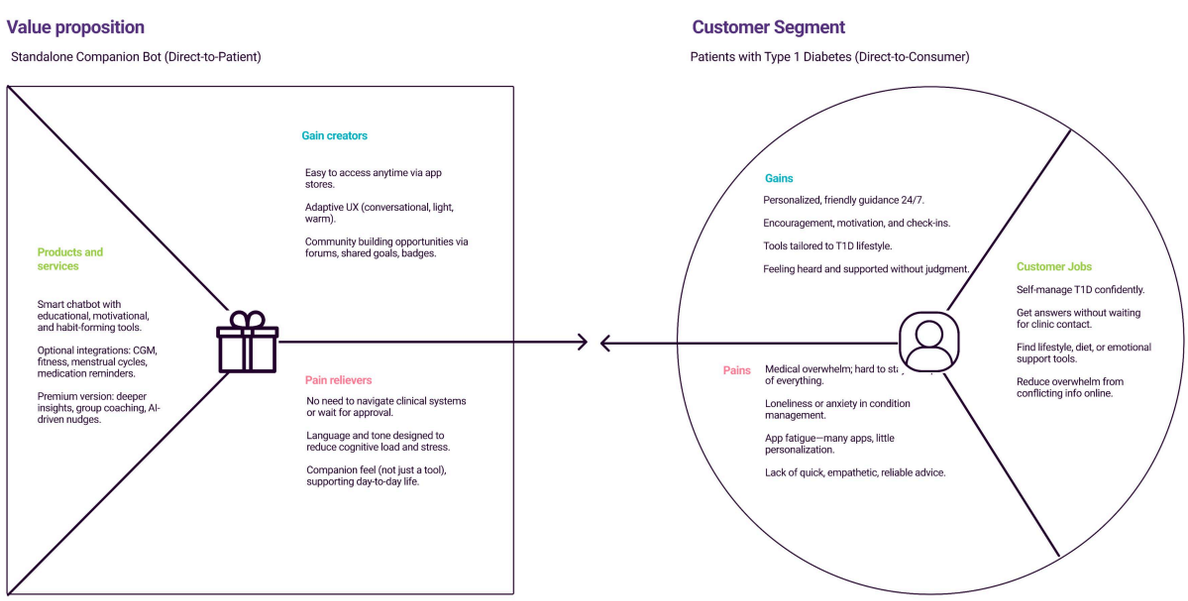


Figure 5.31: Value proposition canvas - Leefmaatje integration with Hospitals B

The figure 5.31 outlines the value proposition of Leefmaatje as a standalone bot addressing direct-to-patient needs.

This version of Leefmaatje offers a pathway to scale without requiring institutional gatekeepers, allowing faster iteration and adoption particularly among younger or digitally savvy patients. While it may sacrifice some clinical integration, it excels in emotional intelligence, user empowerment, and ease of use carving a niche as a trusted everyday presence in the lives of those navigating the complex journey of T1D.

5.2.4 Direction Three: Leefmaatje Integration with Insurance

As seen in Chapter 4 and outlined in the patient journey map (p. 69), health insurers emerge as a strategic touchpoint in the diabetes care ecosystem, often being the first and most consistent point of contact for patients. They hold critical datasets, regulate access to care services, and serve as reimbursement engines for both individuals and providers. As visualized in the value exchange mapping (p. 72), insurers influence care pathways at multiple levels: they reimburse hospitals based on service contracts, offer incentives or premiums to patients, and are governed by policies that increasingly favor value-based care.

Within this context, Leefmaatje can evolve into a co-branded, insurer-backed lifestyle tool that supports preventive care and enhances member engagement. Rather than functioning solely as a clinical extension or direct-to-patient companion, this version of Leefmaatje becomes a loyalty-building, compliance-enhancing interface between insurers, hospitals and patients — aligning behavior change incentives with long-term care goals.

This model directly supports insurers' strategic shift toward digital health solutions in B2B contexts. As noted in our ecosystem analysis, insurers are increasingly offering remote monitoring, education programs, and preventive care tools (p, 42), often in collaboration with third-party providers. A tool like Leefmaatje fits seamlessly into this landscape, digitizing self-management support and enabling insurers to deliver tangible value to members outside hospital settings.

Importantly, this scenario also supports insurers in meeting regulatory and funding goals — such as improved health outcomes, lower claims, and better scores in evaluations by agencies like the NZa or Zorginstituut. By offering early, pattern-based interventions, Leefmaatje may help offset rising chronic disease costs among younger patients while also supporting adherence and autonomy.

The Figure 5.32 visualizes how this concept creates value across both patient and insurer dimensions.

This insurer-backed model positions Leefmaatje as a preventive force multiplier not just helping patients manage daily life with T1D, but also enabling insurers to play a more proactive, data-informed role in the care journey. It aligns health economics paving the way for sustainable scaling across healthcare networks.

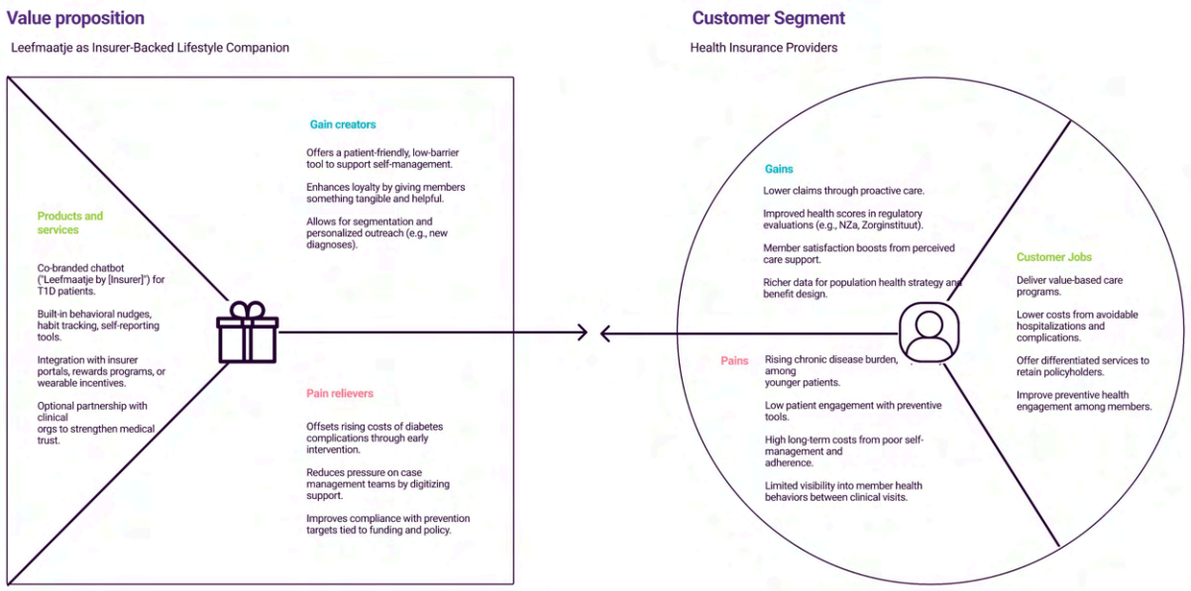


Figure 5.32: Value proposition canvas - Leefmaatje Integration with Insurance

Conclusion:

1. Hospital Integration (EHR-Embedded)
Leefmaatje acts as a triage and self-management tool within hospital platforms (e.g., Radboud+), reducing clinical burden and supporting continuity of care. High credibility and alignment with reimbursement models make it suitable for large-scale adoption.

2. Direct-to-Patient (Standalone App)
Offered via app stores, this model emphasizes emotional support, personalization, and ease of access. Ideal for younger users and daily self-management, though with less clinical integration.

3. Insurer-Backed Companion
Co-branded by insurers, Leefmaatje supports prevention goals, member engagement, and cost reduction through early intervention. It aligns with insurers' shift toward digital B2B healthcare services.

4. Patient Association Partnership
Distributed via patient associations, Leefmaatje enhances emotional support and empowerment while reinforcing the association's mission. A trust-based, scalable pilot environment with low implementation barriers.

Shared Value: All four routes support personalized, accessible diabetes care—each engaging a different system lever while addressing unique stakeholder goals.

5.3

Weighted Matrix

Goal: The purpose of this activity was to systematically evaluate potential implementation concepts for Leefmaatje using a weighted matrix approach, enabling informed and strategic decision-making. Each criterion in the matrix was carefully defined and weighted based on insights gathered from literature reviews, stakeholder interviews, mapping workshops, and persona analyses. The goal was to ensure alignment between the selected concept and the clinical, emotional, operational, and strategic realities of the healthcare ecosystem.

5.2.1 Introduction

To determine the most viable implementation path for Leefmaatje, a weighted matrix was used to evaluate four concepts: Patient Association-led, Hospital Integration, Standalone (D2C), and Insurer-Backed.

Criteria were drawn from research insights, stakeholder inputs, and literature, with weights reflecting their strategic importance—such as Trust & Clinical Alignment (10) and Phased Information Delivery (9). Each concept was scored against these to identify which model best balances user needs, feasibility, and system alignment.

5.2.2 Criteria Definition and Weighting Rationale

Trust & Clinical Alignment (Weight: 10)
Repeatedly highlighted as the most critical factor (p. 55), clinical trust and alignment ensure the service is credible and embraced by medical professionals. This was weighted highest as it forms the foundation for adoption and legitimacy within care pathways.

Phased & Personalized Information Delivery (Weight: 9)
Insights from PJM literature (p. 47), the patient journey map (p. 70), and stakeholder personas (p. 30) emphasize the need for context-aware, staged communication. Chatbots must offer relevant information at the right time to support self-management and engagement.

Operational Feasibility (Weight: 8)
Based on p. 30 and Figure 3.16 (p. 53), feasibility factors include adherence to timelines, budget, and quality benchmarks. Also includes the need for executive buy-in, resource allocation, and system flexibility—critical to ensure practical deployment.

Strategic Fit with Ecosystem (Weight: 8)
The solution must align with the strategic goals of providers and institutions (p. 30, p. 53). Concepts that integrate with existing business models and workflows are more likely to be supported and scaled.

Emotional & Peer Support Integration (Weight: 7)
Emotional resonance, especially for chronic conditions like T1D, is valued by patient associations and families (p. 52, 54). While not the core driver, it complements clinical functionality and enhances user retention.

Distribution & Access (Weight: 7)
As emphasized by Barend during mapping sessions, wide distribution isn't always necessary. What matters is accessibility for those who need it and the sustainability of the service, even for smaller patient populations.

Criteria	Weight	Patient Association	Hospital Integration	Standalone (D2C)	Insurer-Backed
Trust & Clinical Alignment	10	70	100	50	80
Phased & Personalized Info Delivery	9	45	81	63	54
Emerging Adulthood (18-25)	8	72	40	72	56
Emotional & Peer Support Integration	7	63	42	49	42
Strategic Fit w/ Ecosystem	8	64	72	40	72
Distribution & Access	7	49	56	63	63
Scalability & Sustainability	7	49	35	56	63
Feedback & Adaptability	6	42	42	54	36
Innovation Differentiation	5	25	32	40	30
Total		478	**503**	487	496

Figure 5.33: Weighted comparison of concepts

Scalability & Sustainability (Weight: 7)
Evaluated on the concept's ability to grow beyond initial pilots while remaining viable over time. Factors include platform design, funding models, and institutional integration readiness.

Feedback & Adaptability (Weight: 6)
Highlighted as an important continuous improvement factor (p. 30), enabling iterative service enhancement through user data, behavioral logs, and real-world evidence.

Innovation Differentiation (Weight: 5)
As noted in p. 53, innovation is less about novelty and more about value addition to patients and stakeholders. A successful concept should deliver tangible impact and have a clear service owner, rather than merely being "new."

Formulating Strategic Directions

Hospital Integration (2A) emerged as the top-performing concept with a total score of 503.

This pathway aligns strongly with the most critical success criteria, notably clinical trust, phased information delivery, and strategic fit within healthcare ecosystems. Its integration into EHR systems ensures operational feasibility, and its alignment with institutional mandates makes it a scalable and sustainable solution.

The Insurer-Backed model (3) follows closely with a score of 496.

It scores highly on ecosystem fit, scalability, and sustainability—suggesting long-term potential. However, it ranks moderately in areas such as emotional and peer support and adaptability, indicating a less direct relationship with patient-facing value delivery compared to hospital-led models.

The Standalone Direct-to-Consumer (D2C) model (2B) scored 487.

While it performs well on adaptability and distribution, it lacks strong alignment with clinical trust and ecosystem integration, which may pose challenges for credibility and sustained engagement in a healthcare context.

The Patient Association-led model (1) scored the lowest at 478, though not far behind.

It excels in emotional and peer support and accessibility, reflecting its strong connection with patient needs. However, its relatively lower scores in trust, operational feasibility, and personalization suggest limitations in achieving systemic integration or clinical endorsement at scale.

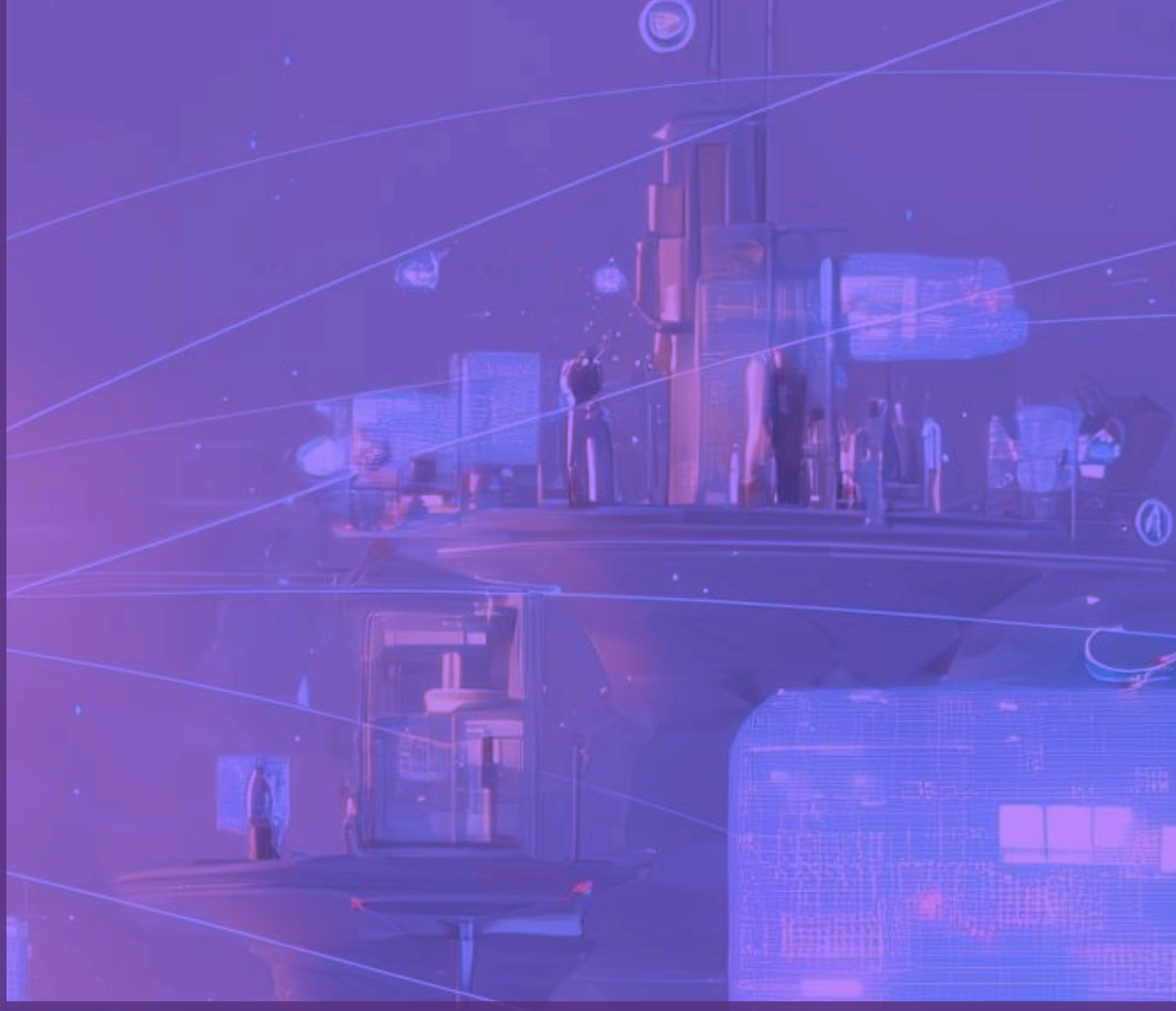
Based on this analysis, Hospital Integration (2A) is the most strategically aligned and operationally feasible path forward for Leefmaatje. It offers the highest potential to meet both clinical standards and systemic digital transformation goals. The Insurer-backed concept also presents a viable long-term route, especially in contexts where reimbursement and ecosystem support are crucial.

Chapter 06: Chosen World

From direction to integrated concept

In this chapter

Background Image | *Image Generated using Mid-Journey to visualize a digitally interconnected world of healthcare*



Define

Research

Synthesis

Design

Test

This chapter focuses on Scenario 2A, which explores the integration of Leefmaatje into Radboud+, an application embedded within Electronic Health Record (EHR) workflows. The aim is to build on the value proposition from the previous chapter, extend it into business model canvas and synthesize earlier research insights into a concrete operational business case. This includes defining a clear value proposition for both patients and hospitals, and identifying key stakeholders, activities, and resources essential for implementation. The concept is further probed into specific service features and developed into a Provo-type—a tangible concept used during interviews to demonstrate potential impact and gather feedback on its fit within existing hospital practices. A pitch was also created, accompanied by a semi-structured interview guide, to evaluate the concept's value, stakeholder roles, and resource requirements.

Background Image | *Image Generated using Mid-Journey to visualize a digitally interconnected world of healthcare*

6.1

Business Model Canvas

Business Model Canvas: This framework was used to translate the insights from different researches so far informed the business case for Leefmaatje integration with hospitals, ***2A: Existing Channels & Triage, EHR, Holistic Hospital Linked Care System.*** *The canvas mainly consists of hypotheses the value proposition, key stakeholders, key resources and key activities are the parts of the BMC that were chosen to be tested. To see hospital's alignment for Leefmaatje's integrated implementation concept.*

6.1.1 Value Propositions & envision implementation using BMC

To get such service integrated in care pathways it is important to 1st see alignment on the value propositioning and then get the stakeholders to agree on their roles either through data, expertise or funding (Expert Interview Eric Gu). There is a possibility of 1 stakeholder having more than 1 role given that the stakeholder can be a person or an organization.

What do I mean by data, expertise and funding in the given context:

Data

One aspect of this is patient data upon which the bot is trained, and 2nd is informational data which needs to be tailored to patient data. The idea is to 1st build decision tree to funnel the patient query to be answered by bot, or be addressed by nurse or doctor / specialist through email, call or consultation. And if to be answered which information needs to be provided through bot. Both the data is available with hospitals but to make sense of it there needs to be collaboration between HCPs and Patient Association

Expertise

ICT / NLP technical services, to build and iterate and improve on this service which currently is in question to be outsourced or in housed. And second is personalization of content expertise which is expertise of HCP's.

Funding

To build such a service and maintain it requires roughly half a million euros. The service if provides PROM / PREM can be positioned for reimbursement from insurers in lines with patient journey app, another way of looking at it is replacing the existing triage of queries and saving HCPs redundant consultation time.

6.1.2 The Concept

Leefmaatje is a hybrid digital-human support system designed to enhance emotional and behavioral support for Type 1 Diabetes (T1D) patients, particularly during non-clinical moments in their care journey. Developed with and for RadboudUMC, it integrates an AI-driven chatbot with a trained peer support network, offering personalized, context-aware, and low-threshold engagement.

The concept is tailored to the Radboud+ ecosystem as a relational care layer, complementing traditional clinical workflows by addressing gaps in early-stage emotional needs, helping patients feel seen and supported before formal interventions are needed. It contributes strategic value to hospitals by improving care continuity and potentially reducing clinician workload, while providing patients with immediate, empathetic support.

KEY PARTNERS

- Hospitals (Data), in this case RadboudUMC has the patient personal data (EHR) and ability to tailor information for patients.
- Medical Content Boards: Clinical oversight and alignment of information flow with care delivery.
- Insurance company (Funding), in this case VGZ (Biggest insurance provider at Radboud.
- Patient advocacy groups – DVN, content co-creation for patient profiling and iteration.
- Government (Funding): Grants work improving care delivery and work efficiency
- Tech Support / ICT (tech expertise): Out-sourced or in-housed of the service development and improvement
- Regulatory board / person (Expertise): overseeing the implementation ethically in accordance to Ai Act, MDR & GDPR policy

KEY ACTIVITIES

1. Bot training, testing, and iteration with real patient data – Hospital, Tech experts & DVN
2. Content governance to ensure up-to-date, trustworthy information - Hospitals
3. EHR and clinical workflow integration – Hospital ICT
4. Continuous outcome evaluation by measuring impact on adherence, HCP time saving and patient satisfaction – Hospitals surveys through bot
5. Cowriting reimbursement cases with insurers – HIL?

KEY RESOURCES

1. Conversational AI engine (NLP tuned for medical literacy but also lay language)
2. Patient Logs – data infrastructure to track interactions, trigger alerts, share insights
3. GDPR/AI Act/ MDR -compliant hosting, with audit logs
4. T1D content pipeline co-designed with clinicians and patients, life stage frameworks and patient profiling
5. Advisory board (endocrinologists, nurses, adolescent psychologists)
6. Privacy, security, and compliance layer (GDPR, HIPAA)
7. Time to time surveys: to build contextual data

VALUE PROPOSITION

For Hospitals & HCP's

a. Improves care provision through information delivery by being available 24*7
b. Reduces Admin burden by answering low-complexity queries and filtering.
c. Can boost patient self-management confidence
d. Hospital: Free up time of expensive resources eg doctors
e. Opens way to know more about patient population & characteristics, the contextual data

For Patients

a. Available 24/7 for questions, clarification, nudges
b. Reduces anxiety during new stages
c. Offers context-relevant info at key life and health decision points
d. Lowers threshold for certain private questions experience.

CUSTOMER RELATIONSHIPS

1. Collaborative Onboarding with the diabetes nurse / internist
2. Follow-up & feedback loops for HCPs based on chatbot interactions – Prepping for consults
3. Patient education pathway support tailored per hospital protocols

CHANNELS

1. EHR-integrated chatbot
2. Radboud +
3. SMS/ WhatsApp -based assistant (difficult to retain patient data to retain personalisation unless linked with patient's registered phone number)

CUSTOMER SEGMENTS

Primary:

a. RadboudUMC (service provider)
b. VGZ (Reimbursor)

Secondary

a. Pediatric and adult diabetes units

Tertiary: (if not hospitals)

a. Caregivers (parents, guardians)
b. Diabetes Care Team

COST STRUCTURE

1. Development and maintenance of chatbot
2. Clinical co-design and validation (e.g., interviews, focus groups, usability testing)
3. Compliance, data hosting, and security audits

REVENUE STREAMS

- Institutional grants/subsidies for digital transformation in chronic care
- Ongoing research partnerships for clinical impact studies

Figure 6.34: Business Model Canvas Hospital Integration Concept

6.1.3 Business Model Canvas

Different parts of the Business Model Canvas (BMC) were informed by various research and validation insights as follows:

1. **Key partners:** Key stakeholders needed for this Leefmaatje are Hospitals (RadboudUMC), VGZ (insurer), DVN (patients), Tech experts, Government (grants), Regulatory experts. (p,30)
2. **Key Activities:** Core tasks to build, maintain, and improve Leefmaatje include Bot training, content governance, integration with EHR, continuous outcome evaluation, reimbursement prep.
3. **Key Resources:** Assets critical to delivering Leefmaatje's service, both technical and human include AI model, patient logs, compliant hosting, expert advisory board, co-designed content, data governance tools.
4. **Value proposition:** Benefits delivered to both hospitals and patients. For HCPs; Reduces admin load, supports care delivery, unlocks insights. For Patients; 24/7 support, reduced anxiety, context-aware guidance. (p, 58)
5. **Customer relationships:** Ways of engaging with both patients and HCPs to build trust and retain usage include onboarding with HCPs, interaction-based feedback, patient education. (p,70)
6. **Channels:** Means of delivering the service to users. This include EHR-integrated chatbot and or SMS/WhatsApp assistant as a mock. (p, 39)
7. **Customer Segments:** Target users and stakeholders who receive value or fund the service these primarily include RadboudUMC, VGZ (p, 42)
8. **Cost structures:** Key cost drivers for implementation and maintenance includes: Chatbot integration, content pipeline upkeep and data hosting & maintenance costs.
9. **Revenue Streams:** Funding sources to sustain and scale the service include Institutional grants, insurance reimbursement, research partnerships.

6.1.2 Establishing What to Test

The Business Model Canvas outlines several hypotheses from an implementation perspective. As the concept of Leefmaatje has evolved into a more integrated model, it is now entering a more focused testing phase. The upcoming chapter will concentrate on specific components of the business model canvas, particularly the **value propositions for key stakeholders** such as hospitals, healthcare providers, and patients. In parallel, key partners, including critical stakeholders and their **respective roles**, are being evaluated in terms of their contribution to implementation. Furthermore, the key activities and **key resources** necessary for success have been identified and prioritized for this next phase of testing.

Conclusion:

Leefmaatje is transitioning into a focused testing phase that hones in on validating its core value propositions for hospitals, healthcare providers, and patients. At the same time, the roles of key partners and the essential activities and resources required for successful implementation are being carefully assessed and prioritized. This targeted approach will help ensure that the model is both viable and impactful as it moves closer to broader adoption.

6.2

Probing

Goal: The goal of this phase is to generate probes and provo-types for the proposed value proposition and the implementation of defined concept. By employing design fiction, this phase aimed to make an imagined, future healthcare scenario tangible for stakeholders and to elicit critical feedback and reflections through speculative artifacts.

6.2.1 Introduction

Design fiction was used as a tool to provotypes the future integration of Leefmaatje into clinical workflows and patient journeys. Rather than presenting abstract concepts, I developed visual probes that rendered the fictional but plausible service real enough for participants to engage with meaningfully. These probes were shown during interviews and functioned as conversation starters to explore desirability, feasibility, and potential roles within the envisioned system. The speculative future was described in narrative form (included in Appendix G), which served as a foundation for the visual materials.

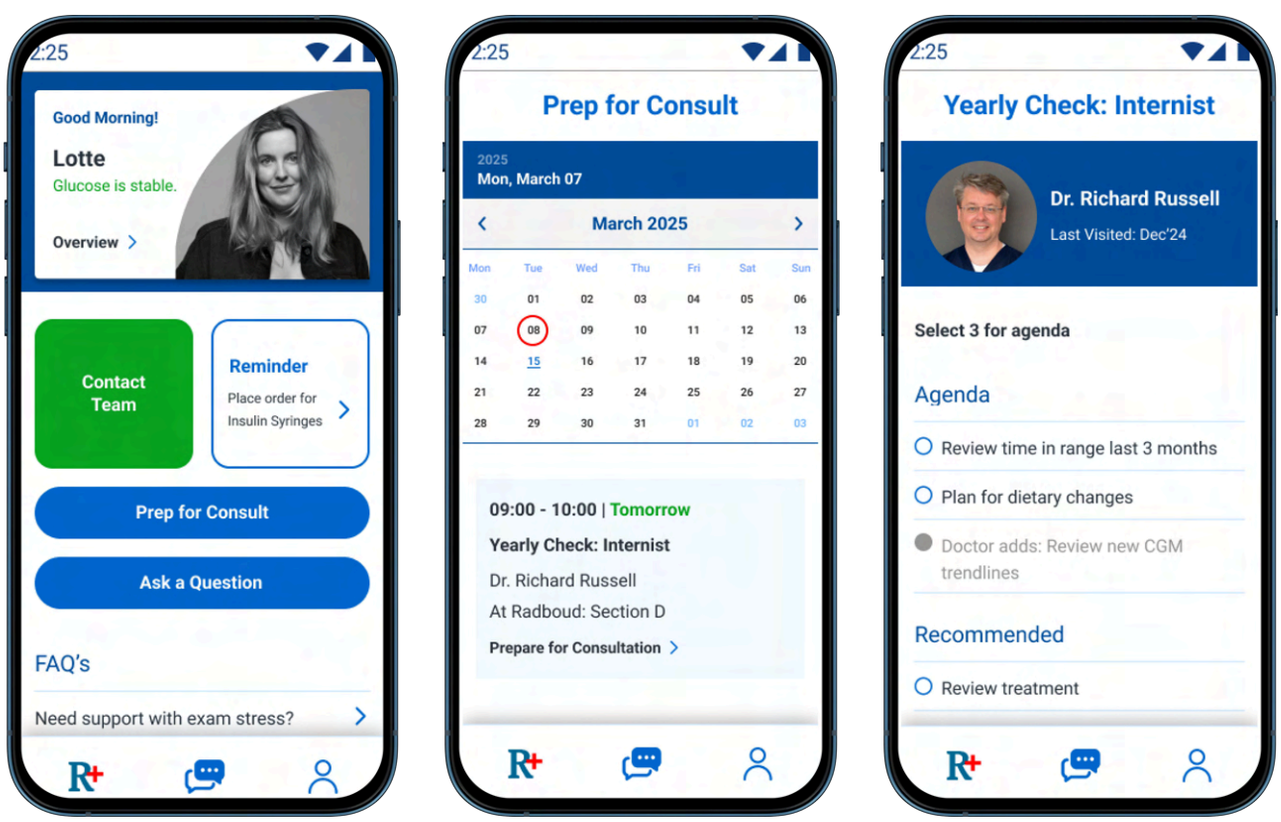


Figure 6.35: Hospital Integrated concept Leefmaatje, Prepping for HCP visit (Patient interface)

6.2.2 Description of Probes

Figure 6.35 interface shows, integrated concept supports patients in preparing for their healthcare provider consultation. It allows patients to log their questions in advance, receive personalized prompts based on previous interactions, and select priority topics for discussion. Patients can also set reminders and receive tailored content based on their current life phase (e.g., puberty, menstruation, travel). As explained in the interview, this screen was designed to lower anxiety and enhance consultation outcomes through better anticipatory guidance.

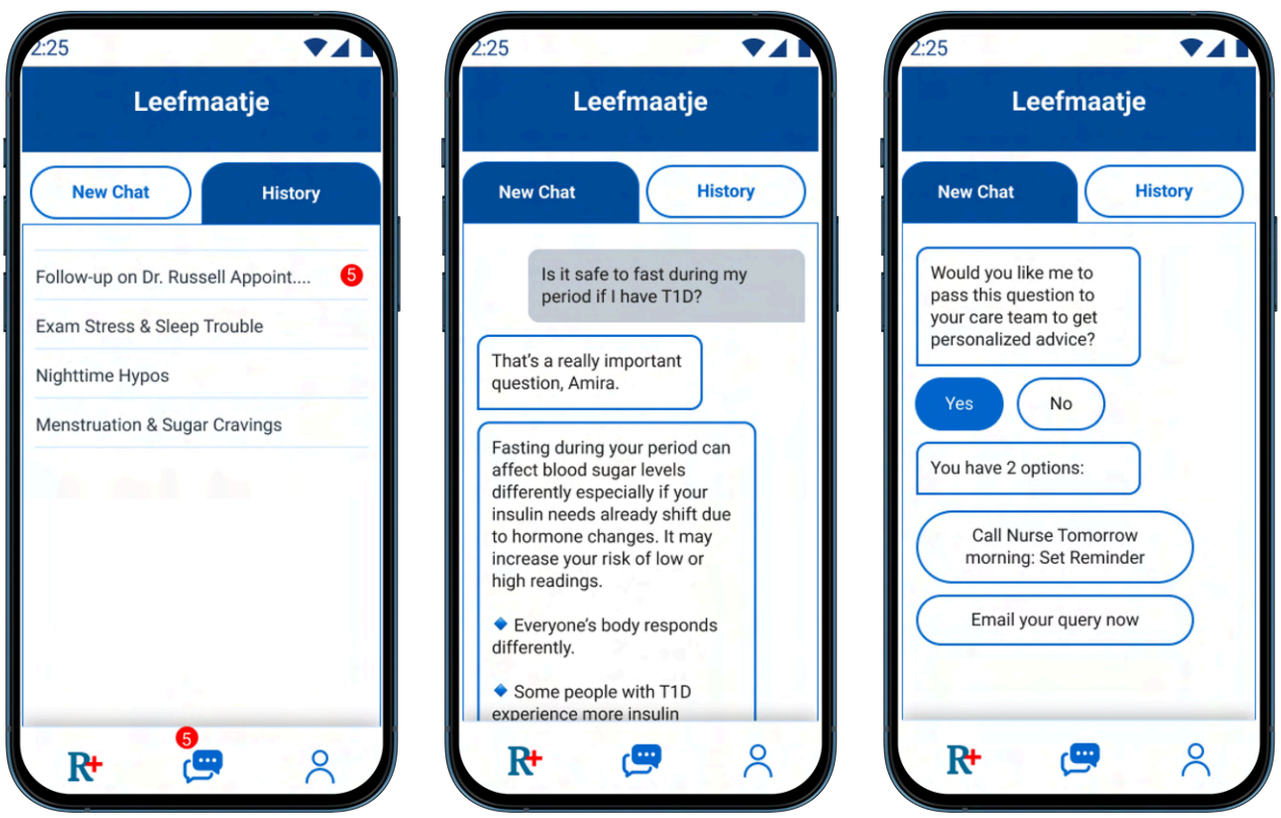


Figure 6.36: Hospital Integrated concept Leefmaatje, follow-up, and triaging queries (Patient interface)

Figure 6.36 screens enables post-consultation follow-up by Leefmaatje, gathering feedback about the appointment and checking whether the patient has lingering questions. Based on the type of question—ranging from informational clarification to medical advice—the bot either provides an immediate answer or redirects the patient to the appropriate communication channel (email, call, or consultation request). As described, the design ensures that lower-complexity questions are answered promptly, while high-complexity or sensitive queries are triaged to professionals.

Figure 6.37 This early prototype visualizes how healthcare providers might access relevant patient information in preparation for or during consultations. The dashboard includes behavioral insights, prior Leefmaatje interactions, flagged questions, and contextual notes on the patient's self-management patterns. As noted in the conversation, this feature could enhance continuity of care and reduce redundant discussions by providing pre-consultation context.

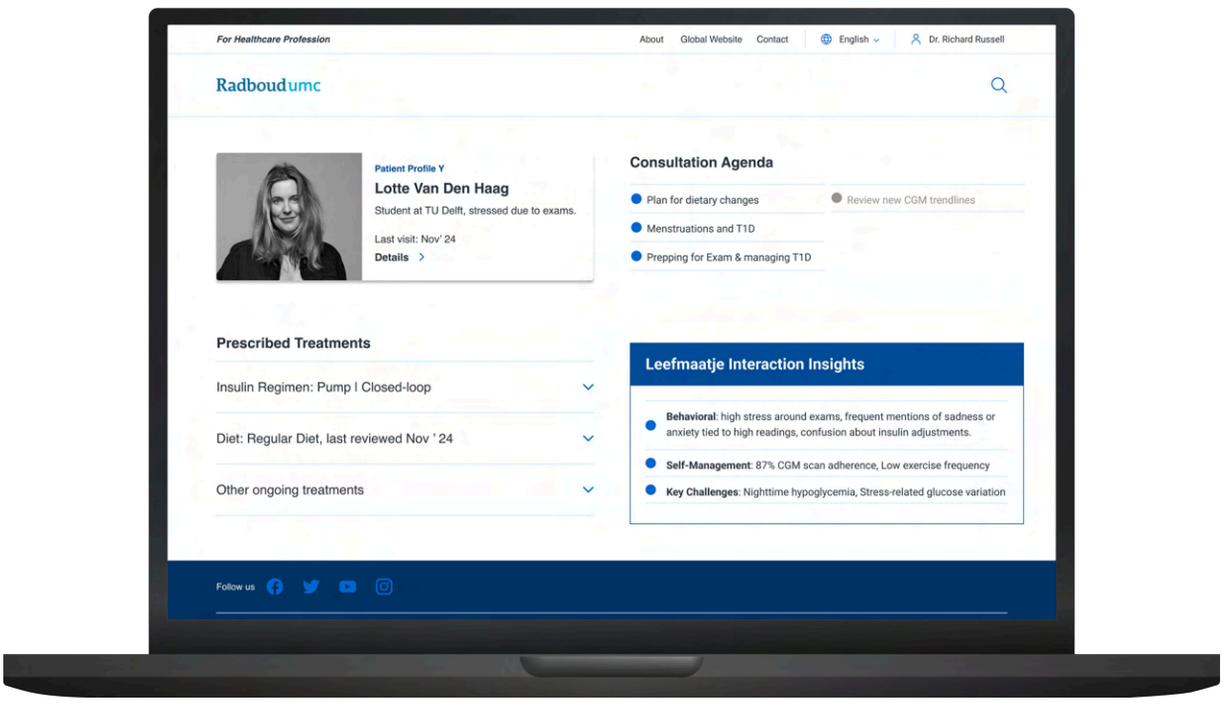


Figure 6.37: Hospital Integrated concept Leefmaatje, dashboard for consultations (HCP interface)

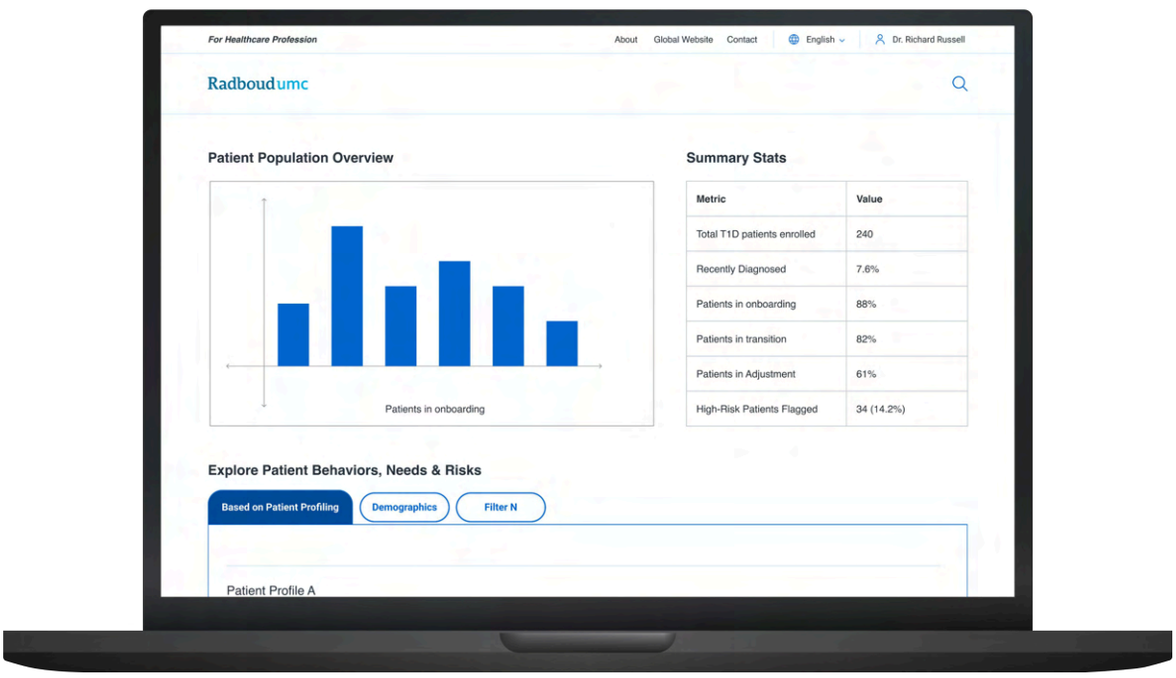


Figure 6.38: Hospital Integrated concept Leefmaatje, patient population overview (HCP interface)

Figure 6.37 This side of dashboard offers a macro-level view of the patient population, aggregating trends and behavioral data to identify emerging patterns. For example, it could reveal lower treatment adherence in a specific profile group or surface frequently asked questions. While still in early conceptualization, this view was meant to provoke discussion on data governance, patient privacy, and system-level learning.

Figure 6.39: Slide deck in a glimpse

In parallel, a structured slide presentation was used to guide the interviews and provide background on the service concept. The presentation included:

- Background and context of the project
- Key problems identified from research
- The speculative service concept and early interface visualizations
- The proposed value proposition for patients and HCPs
- Integration points within the existing clinical workflow
- Required stakeholder roles for implementation

The slide deck was aligned with a semi-structured interview guide (Appendix Y) to ensure consistency across conversations while allowing flexibility for emerging insights. It supported mutual understanding and allowed interviewees to engage with the idea progressively, from problem framing to system-level implications.

Conclusion:

The probing phase created a shared speculative space in which stakeholders could reflect on and challenge the future integration of Leefmaatje. By grounding abstract possibilities in tangible artifacts—both visual and narrative—participants could engage with the concept critically and constructively. The combined use of design fiction, interface prototypes, and narrative-driven slides proved effective in uncovering not only user needs and workflow considerations but also institutional barriers and opportunities. These insights informed the refinement of the concept and served as input for evaluating its placement within the broader healthcare ecosystem.

From direction to integrated concept

Technical Lens

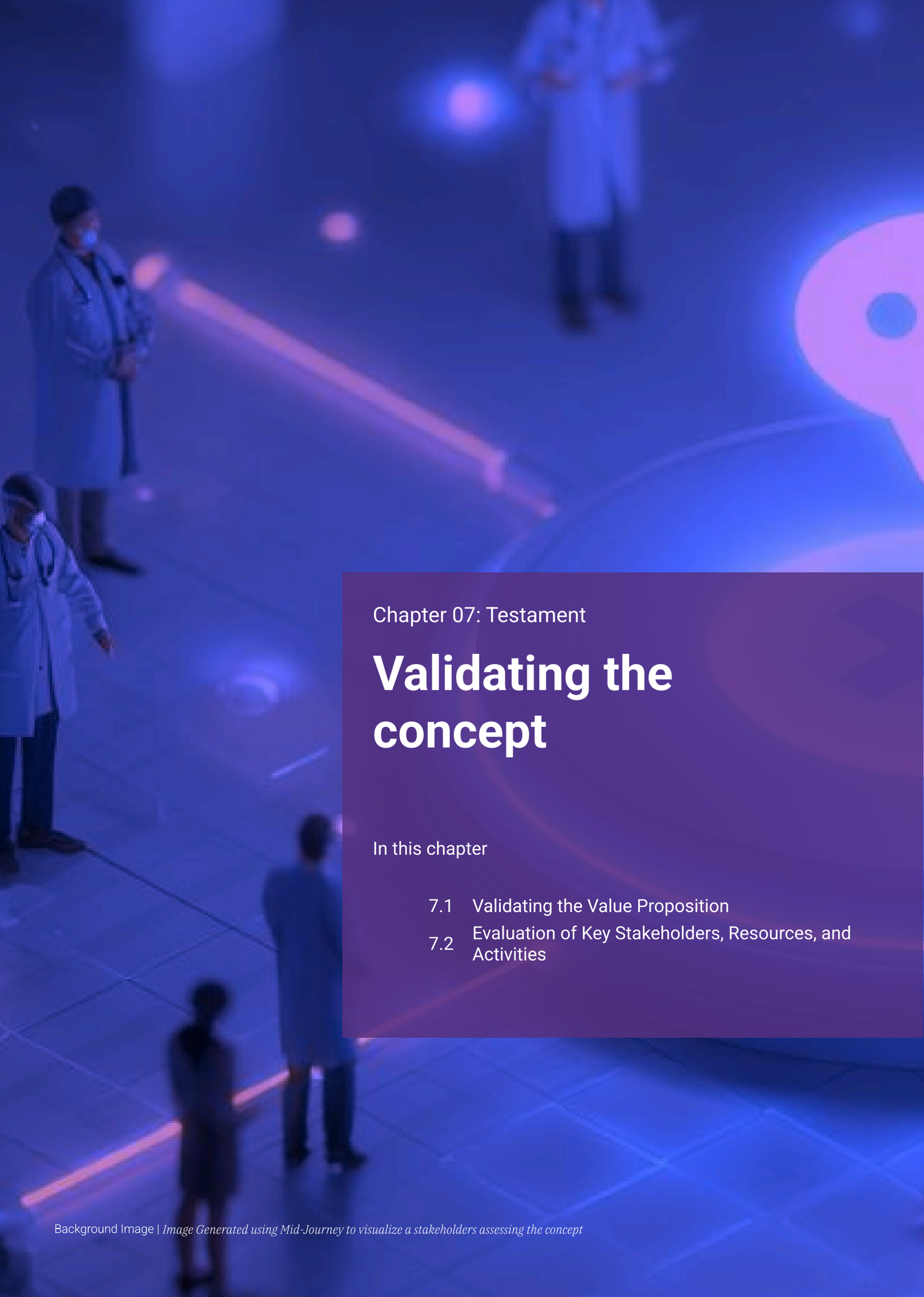
From a technical standpoint, Leefmaatje represents an engineered hybrid support system that leverages AI-driven chatbots integrated within Electronic Health Records (EHRs). The focus is on embedding personalized, context-aware, and empathetic digital interactions alongside human peer support. Key technical challenges such as NLP service delivery, secure data governance, and EHR integration have been mapped out through the Business Model Canvas. The probing phase underscored the importance of fine-tuning chatbot workflows, decision trees for triaging, and user interfaces that lower anxiety while enhancing engagement.

Business Lens

From a business perspective, Leefmaatje is transitioning from conceptualization to a structured value-driven model. The Business Model Canvas has helped define core value propositions for patients, hospitals, and insurers, while outlining essential activities like bot training, content governance, and integration maintenance. With potential cost savings by reducing HCP workload and administrative burden, as well as monetization paths via insurance reimbursement or research grants, the service is being positioned as a sustainable solution. The alignment of stakeholder roles especially in funding, data sharing, and expertise, emerges as a critical factor for successful implementation and scalability.

Healthcare Ecosystem Lens

Within the broader healthcare ecosystem, Leefmaatje introduces a relational care layer that complements clinical workflows and fills emotional and behavioral support gaps in Type 1 Diabetes care. By engaging both patients and providers in a shared speculative space, the design fiction approach revealed institutional barriers, integration opportunities, and trust-building necessities. It aligns with emerging healthcare models focused on continuity, personalization, and preventative support. Importantly, its integration into hospital systems like Radboud+ paves the way for collaborative, data-informed, and person-centered care marking a shift towards more holistic and digitally integrated chronic care pathways.



Chapter 07: Testament

Validating the concept

In this chapter

Background Image | *Image Generated using Mid-Journey to visualize a stakeholders assessing the concept*

This chapter presents the evaluation of the integrated Leefmaatje concept through stakeholder testing at RadboudUMC. Five key stakeholders were engaged to assess the viability, feasibility, value, and potential integration of the service within existing clinical and administrative systems. Participants included a business analyst with prior experience in the insurance sector, now overseeing hospital-insurer contracts at HIL—three representatives from the diabetes department (an internist, a service innovation reviewer, and the department head), and an ICT specialist from Radboud. The goal of this phase was to validate the concept's alignment with institutional workflows, identify enablers and barriers to implementation, and gather input on roles, responsibilities, and strategic fit within the broader care and reimbursement ecosystem.

Background Image | *Image Generated using Mid-Journey to visualize a stakeholders assessing the concept*

7.1

Validating the Value Proposition

Goal: To evaluate whether the Leefmaatje concept delivers meaningful value to both hospitals and patients, as perceived by key clinical and innovation stakeholders at RadboudUMC. The interviews assessed the desirability and practical relevance of the service's features, especially its role in improving care quality, administrative efficiency, and patient empowerment.

7.1.1 Participants:

1. Internist (Diabetes Department)
2. Innovation Reviewer (Diabetes Department)
3. Department Head (Diabetes)
4. Business Analyst (Reimbursement & Hospital-Insurer Relations)
5. ICT Specialist (Radboudumc ICT Team)

7.1.2 For Hospitals: Enhancing Efficiency, Insight, and Care Quality

Stakeholders acknowledged that the Leefmaatje service has the potential to optimize resource use, especially in stretched care settings. Several interviewees highlighted that medical specialists and nurses often respond to similar low-complexity, non-medical patient questions, the time that could be reallocated with a system like Leefmaatje in place.

> *"There are so many questions patients ask that don't require a doctor. If they could managed better or even filtered before they reach us, that's already a win."*
>
> *- T1D Internist at Radboudumc*

The 24/7 availability of Leefmaatje, particularly chang in triage-style for queries, was seen as an important enabler for reducing similar touchpoints. Stakeholders also saw value in automating some queries during sensitive transition periods in care.

Beyond task delegation, the concept was praised for potentially enhancing contextual insight into patient behavior and characteristics. By capturing interactions and concerns raised by patients, Leefmaatje could surface patterns that traditional clinical data often misses.

> *"The value is not just in the conversation it's in what we learn. You start seeing what people ask at 2am, what they worry about when they leave the clinic."*
>
> *- Diabetes Innovation Reviewer*

This contextual data could inform service design, personalized care approaches, and even policy advocacy around patient needs.

Additionally, the business analyst noted that such a model could support better planning and resource forecasting, as it adds a layer of soft data collection that traditional pathways overlook.

"Hospitals know little about what happens in the patient's head outside the system. This gives us eyes and ears there."

- Business Analyst at Radboudumc

"A lot of non-compliance isn't rebellion—it's confusion or fear. Something like Leefmaatje lowers that threshold."

- T1D Internist at Radboudumc

7.1.3 For Patients: Empowerment, Clarity, and Reassurance

From the patient value propositio perspective, stakeholders were especially enthusiastic about Leefmaatje's role in reducing anxiety, boosting self-confidence, and offering accessible information at key decision moments.

Patients dealing with chronic conditions often face emotional and cognitive overload—especially during new stages of care (e.g., first diagnosis, therapy adjustments, or life transitions). Leefmaatje's constant availability was seen as a highly desirable feature, offering not just answers.

"You can't call your nurse at 11pm to ask if it's normal to feel shaky after insulin. But you can message Leefmaatje."

- Department Head (Diabetes) at Radboudumc

The availability of context-relevant info, filtered through a peer or conversational interface, was also considered a valuable educational tool. It could help patients internalize care instructions and feel more in control of their treatment journey.

Stakeholders emphasized how shame or embarrassment often inhibits patients from asking certain questions. Leefmaatje, framed as low-pressure and friendly, could increase openness and early signaling of emerging issues.

"There's a real difference between asking your endocrinologist a question, and asking someone who's walked in your shoes. That's where trust lives."

- Diabetes Innovation Reviewer

This directly supports patient empowerment, one of RadboudUMC's strategic goals (p,20).

7.1.4 Shared Value Perspective: Where Hospital and Patient Interests Align

A key insight from the interviews is the convergence of value: **what helps the patient also helps the system.**

For example:

- Patients asking fewer redundant questions = less admin burden.
- Patients managing better = fewer acute interventions.
- Patients sharing concerns earlier = better consultation & risk management.

"Every time someone feels heard before it becomes a crisis, that's care we didn't have to escalate."

- Business Analyst at Radboudumc

This dual benefit positions Leefmaatje not just as a wellness tool, but as a strategic service innovation that aligns institutional efficiency with improved patient experience. This if we collect enough evidence, such services can be partially if not fully covered by hospitals and or insurance.

Conclusion:

Across the four stakeholder interviews, the proposed value proposition of Leefmaatje was strongly validated on both institutional and patient fronts.

For hospitals, it promises administrative relief, resource optimization, and better data-driven insight into patient needs. For patients, it provides constant, shame-free access to support, emotional reassurance, and timely information, especially during high-stress transitions.

The success of Leefmaatje as a value-adding service hinges not only on its technical execution but on maintaining its human-centered, empathetic approach. If it can retain emotional authenticity while scaling, the service has the potential to transform both the experience and delivery of chronic care support at RadboudUMC and beyond.

7.2

Evaluation of Key Stakeholders, Resources, and Activities

Goal: To critically evaluate the Leefmaatje concept's implementation readiness by validating the proposed ecosystem of stakeholders, resources, and activities. This assessment is grounded in direct feedback from stakeholders at RadboudUMC and related institutional partners, reflecting practical, clinical, and strategic realities.

7.2.1 Key Stakeholders

Hospitals / RadboudUMC

Stakeholders unanimously confirmed that the hospital is not only the central actor in implementation but also the most critical enabler due to its ownership of patient data, infrastructure, and clinical workflows.

> *"If we're talking about personalisation, it starts with the hospital. We have the data, we know the patient journeys."*
>
> *- Department Head (Diabetes) at Radboudumc*

The internist and ICT expert at Radboud highlighted that integration with the EHR system (EPIC) is essential for tailoring content, tracking interactions, and creating value through personalization.

> *"The system must be secure and connect with EPIC. Without that, it's just a chatbot, not part of care."*
>
> *- ICT Specialist*

Medical Content Boards

Interviewees emphasized the importance of clinically approved, patient-friendly information that aligns with medical protocols.

> *"There needs to be a content loop. Doctors don't have to write it, but they must trust it."*
>
> *- T1D Internist at Radboudumc*

The innovation reviewer also stressed the need for "trusted editorial governance", especially to ensure medical accuracy and avoid liability issues when bots interact with patients.

Insurance Provider (VGZ)

The business analyst emphasized that reimbursement models are not yet ready for AI-enhanced peer or bot-based services but acknowledged VGZ's increasing openness to preventive, efficiency-boosting tools.

"VGZ wants value-based care, but we need hard outcomes. If the bot saves doctor time or improves adherence, then we have a case."

- Business Analyst at Radboudumc

This supports your assumption that co-writing reimbursement cases with insurers (HIL + Hospital) will be necessary and must be backed by robust outcome data.

Patient Advocacy Groups (e.g., DVN)

The value of involving advocacy groups was confirmed, especially in the context of user profiling, content design, and trust-building.

"You want patients involved from the start. They know the language. They'll tell you if it feels fake."

- Diabetes Innovation Reviewer

This affirms DVN's role in co-creation and in refining bot tone and content for authenticity.

Government / Public Funders

While no direct government actor was interviewed, several stakeholders acknowledged the strategic alignment of Leefmaatje with public goals of efficiency and digital health innovation.

"There's a lot of interest in digital self-management. But you'll need to show outcomes—engagement, satisfaction, savings."

- Business Analyst at Radboudumc

This indirectly supports the potential for government grants, especially if early pilots demonstrate system-wide efficiency.

ICT / Tech Experts

The ICT specialist validated the need for dedicated tech support, whether outsourced or embedded. Core tasks include EHR integration, data security compliance, and interoperability.

"If you want full control and data protection, build it in-house. But you need the people and budget. Outsourcing is fine too — if the standards match hospital policy."

- ICT Specialist

This confirms the need for a cybersecurity and compliance-first approach to any technical deployment.

Regulatory Expertise

While not explicitly addressed by all stakeholders, both the ICT expert and innovation reviewer raised concerns related to GDPR, MDR, and AI Act implications.

"The second you store or even analyze patient interaction, you're under MDR or GDPR. You need a regulatory expert early."

- ICT Specialist

This supports your assumption that in-house or consultant-level regulatory guidance is essential from the pilot phase.

7.2.2 Key Resources

Patient Data & EHR Access

The most critical institutional resource is the hospital's access to Electronic Health Record (EHR) systems, EPIC. This enables tailored communication, contextual relevance, and integration into existing clinical workflows.

> *"The system must be secure and connect with EPIC. Without that, it's just a chatbot, not part of care."*
>
> *- ICT Specialist*

Medical Knowledge & Content Layer

Clinically validated, patient-friendly content is a non-negotiable resource. This includes:

- Core medical information aligned with standard care protocols.
- Context-aware language for different stages in the care journey.
- Updates aligned with treatment guidelines and patient insights.

> *"It needs to feel safe and be up to date. That's not a one-time thing."*
>
> *- Diabetes Innovation Reviewer*

Technical Infrastructure

Robust technical systems are required to:

- Enable 24/7 conversational interactions.
- Maintain GDPR-compliant data processing and storage.
- Support interoperability with existing hospital tech stacks.
- This may be developed in-house or outsourced, but standards must align with GDPR, MDR, and AI Act compliance from day one.

Training and Testing Environments

Safe, structured testing environments using real patient questions and interaction flows are essential for iterating both content and tone. Feedback loops with patients and clinicians will inform tuning and trustworthiness.

> *"If you don't test with real patient flows, you'll never uncover what people actually ask or fear."*
>
> *- T1D Internist at Radboudumc*

Governance and Oversight Capacity

A framework for oversight and accountability is a foundational resource, including:

- Medical boards for content approval.
- Patient panels or DVN for relevance checks.
- Legal and regulatory experts to monitor compliance.

7.2.3 Key Activities

The implementation of Leefmaatje hinges on a carefully designed set of ongoing operational activities that balance clinical oversight, technical development, and user-centered iteration.

Bot Training, Testing, and Iteration

Development involves continuous refinement using real patient interaction data, co-designed with patient representatives (e.g., DVN), and validated by clinical staff. Iteration includes tone calibration, scenario simulation, and outcome measurement.

> *"You want to know how people really phrase things when scared or uncertain."*
>
> *- Department Head (Diabetes) at Radboudumc*

Content Governance and Updating

Establishing a content governance board is essential to ensure that:

- Information is medically accurate and aligned with evolving care practices.
- Language and tone remain relevant across diverse patient groups.
- Updates are regularly reviewed and implemented.

> *"Doctors don't have to write it, but they must trust it."*
>
> *- T1D Internist at Radboudumc*

Clinical Workflow and EHR Integration

Leefmaatje must be embedded in existing hospital processes:

- Referral points and triggers (e.g., after diagnosis or discharge).
- Integration with EPIC for personalization and documentation.
- Notification protocols for when escalation to a care team is required.

> *"If this doesn't connect to EPIC, it's going to stay on the sidelines. Clinicians won't adopt something they have to leave their workflow for—it needs to feel like a part of the system."*
>
> *- ICT Specialist*

Impact Measurement and Continuous Evaluation

To justify long-term adoption and funding, Leefmaatje must demonstrate tangible outcomes, such as:

Reduction in HCP time spent answering routine questions.

- Improvement in treatment adherence and patient satisfaction.
- Behavioral metrics from patient engagement and retention.

Data from patient feedback, interaction logs, and surveys should feed back into design improvements and future funding cases.

Reimbursement Case Development

Working with insurers (e.g., VGZ) to co-write business cases and reimbursement scenarios is a strategic activity. This includes:

- Demonstrating value-based outcomes.
- Mapping alignment with existing care bundles.
- Coordinating with hospital policy teams (e.g., HIL).

> *"It's not reimbursable yet, but that's where the conversation must go."*
>
> *- Business Analyst at Radboudumc*

Validating the concept

Main Design Question:
How might we position Leefmaatje so that it creates meaningful long-term value for all stakeholders? (p,22)

The validation activities conducted in this chapter demonstrate that Leefmaatje offers strategic value for both patients and healthcare providers, and that long-term impact can be achieved by embedding the concept into the heart of clinical workflows. Leefmaatje should be positioned not as a standalone innovation but as a system-enhancing service that extends clinical care beyond the walls of the hospital particularly during moments of transition in the care journe timely information, and behavioral nudges can make a significant difference. Its relational nature enhances care continuity aligning closely with RadboudUMC's long-term vision for proactive, preventive healthcare.

Positioning:
Where to introduce Leefmaatje in the care journey? (p,22)

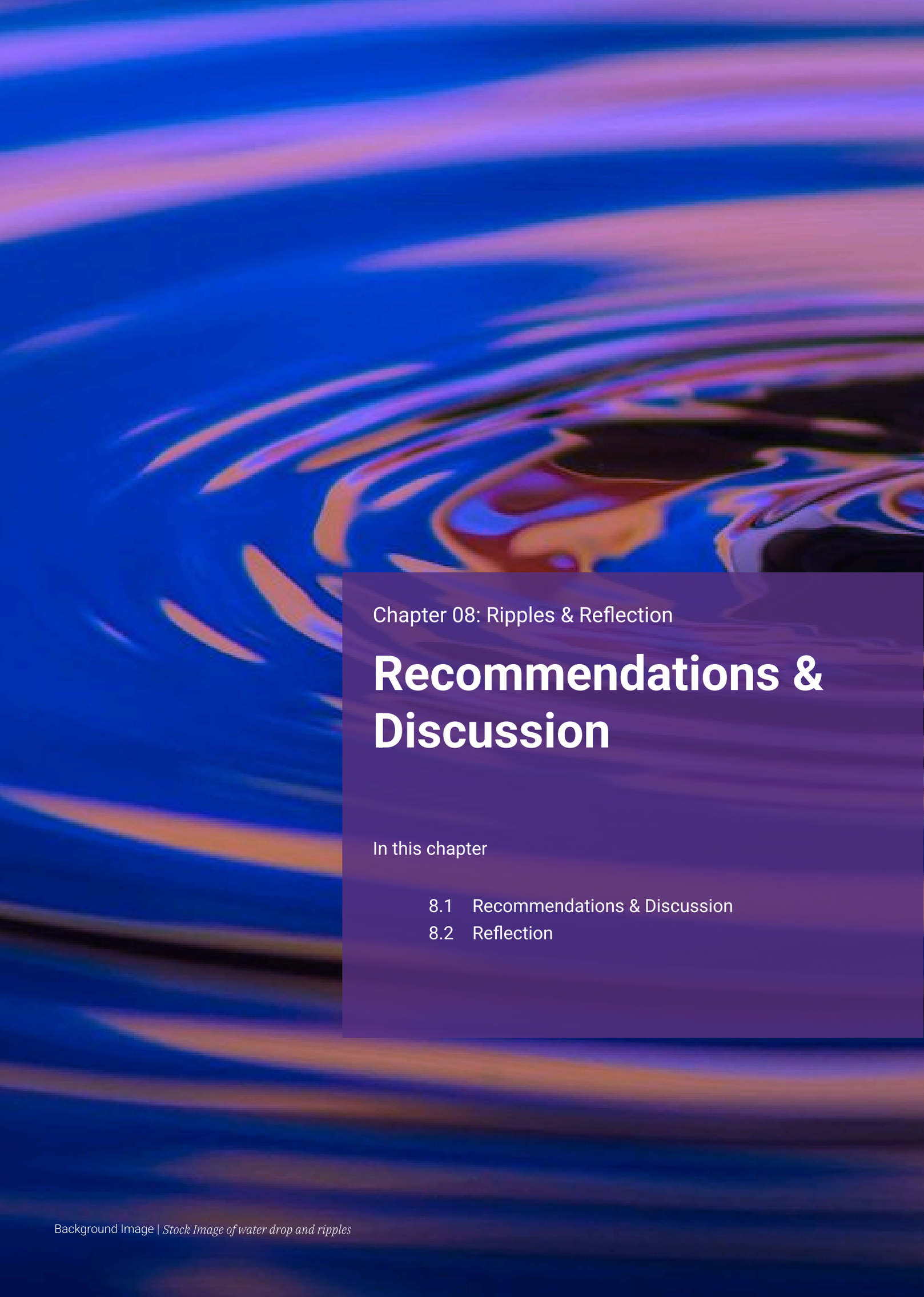
Leefmaatje should be introduced at transitional and emotionally vulnerable points in the patient journey (p,58). These are moments when patients often experience confusion, anxiety, or disengagement, and where traditional care systems may fall silent. Leefmaatje's 24/7 availability and contextual responsiveness make it ideally suited to fill these critical gaps, offering continuous support without replacing clinical interaction.

Stakeholders:
Who are the key stakeholders that must be identified and involved for the successful implementation of Leefmaatje? (p,22)

The successful implementation of Leefmaatje depends on active engagement from a range of internal and external stakeholders. Internally, clinical leaders, innovation managers, IT departments, and data governance experts must collaborate to ensure workflow fit, clinical trust, and compliance with privacy standards. Externally, partnerships with insurers, patient advocacy organizations, and regulatory bodies will be essential for achieving reimbursement pathways, ensuring ethical alignment, and scaling adoption. Importantly, clinical stakeholders emphasized that integration with systems like EPIC is non-negotiable without it, Leefmaatje risks being sidelined.

Viability:
How to design a compelling value proposition for Leefmaatje that ensures a viable and sustainable business? (p,22)

Leefmaatje's dual value proposition supporting patients while optimizing healthcare delivery was validated through interviews with both clinical and innovation stakeholders. Patients benefit from personalized, continuous guidance and emotional reassurance, which may improve treatment adherence and reduce anxiety. Hospitals, in turn, gain operational efficiencies, fewer low-complexity interactions, and qualitative insights into patient behavior. This symbiotic value must be central to any sustainability model. For long-term viability, the solution should be embedded in reimbursable care pathways, supported by clear outcome metrics, co-designed workflows, and governance structures that ensure medical and ethical oversight. Collaboration with insurers and regulators will be vital in shaping a model that aligns clinical impact with financial feasibility.



Chapter 08: Ripples & Reflection

Recommendations & Discussion

In this chapter

Background Image | *Stock Image of water drop and ripples*

Define

Research

Synthesis

Design

Test

This chapter brings together key insights from the research and concept development process to present final recommendations for the future development and implementation of Leefmaatje. It includes a critical discussion of strategic opportunities, potential risks, and practical considerations for scaling and integration. Reflections on the design process, stakeholder feedback, and system-level challenges provide context for understanding the broader implications of introducing AI-driven tools in diabetes care. The chapter concludes with considerations for next steps and areas for further exploration.

Background Image | *Stock Image of water drop and ripples*

8.1

Recommendations & Discussion

The goal of this chapter is to critically reflect on the design, positioning, and future trajectory of Leefmaatje a hybrid chatbot-based support service for Type 1 Diabetes care, by translating research insights into actionable recommendations. It evaluates Leefmaatje through the lenses of emotional support, contextual and experiential information design, and its role within the healthcare ecosystem.

"How might we position Leefmaatje so that it creates meaningful long-term value for all stakeholders?"

By exploring viability, desirability, and feasibility, the chapter aims to:

- *Define the appropriate role of a chatbot in delivering support without replacing essential human care*
- *Identify opportunities and limitations in its integration with clinical workflows*
- *Recommend strategies to ensure that Leefmaatje becomes a trusted, valuable, and sustainable service for patients, healthcare providers, and the broader system.*

8.1.1 Emotional Support: Role of the Chatbot vs. Human Care

While Leefmaatje is not designed to replace the role of psychologists, it holds value in extending the emotional continuum of care between consultations. Emotional distress in Type 1 Diabetes (T1D) often arises outside formal clinical settings, during life events, transitions (e.g., adolescence, leaving home), or in moments of silent struggle. Here, Leefmaatje can act as a low-threshold first touchpoint, offering:

- Compassionate check-ins
- Peer-shared narratives or tips
- Guidance on when and how to seek professional mental health support

However, it must clearly communicate its limits not offering therapy or crisis intervention, but instead functioning as a companion and connector to qualified support systems when emotional strain escalates.

Position emotional support as "peer-informed emotional scaffolding" use the chatbot to recognize emotional triggers and redirect users toward peer networks, psychoeducational resources, or professionals, depending on severity.

- Recommendation

8.1.2 Contextual Information Design

The design of information delivery in Leefmaatje should prioritize timing, relevance, and tone. Rather than overwhelming users with medical jargon or facts, the chatbot can surface micro-content tailored to:

- User's current life phase (e.g., puberty, pregnancy)
- Upcoming events (e.g., travel, exams)
- Recent care milestones (e.g., insulin pump adoption, clinic visits)

This helps the user feel "understood," even without direct human interaction, supporting a relational rather than transactional experience.

Embed context tags and scenario recognition in dialogue flows to guide the bot's responses—"I see you're traveling soon, here's how to store insulin safely during flights."

- Recommendation

8.1.3 Experiential Information Design

Patients benefit not just from facts but from lived experiences, stories, and wisdom shared by others who've been there. Leefmaatje can become a medium for safe, moderated peer experience-sharing, structured as:

- "What helped others like me" sections
- Scenario-based prompts ("What to expect during puberty with T1D")
- Guided storytelling from peer ambassadors

This design invites empathy and normalization, filling an often silent gap in care.

Create an experience database with stories validated and moderated by patient associations or psychologists. Let users opt-in to receive such content, personalized by their journey stage.

- Recommendation

8.1.4 Limitations

While this thesis presents a comprehensive exploration of integrating Leefmaatje for T1D patients into chronic care pathways, several limitations must be acknowledged:

Scope and Contextual Boundaries
This research is grounded in the Dutch healthcare system, specifically involving stakeholders such as RadboudUMC, DVN, and VGZ. The findings, therefore, reflect system-specific dynamics and may not be generalizable to other countries or healthcare infrastructures with different reimbursement models, regulatory frameworks, or digital maturity levels

Qualitative Nature of Data
Much of the insight was derived from semi-structured interviews, stakeholder conversations, and direct observation. While these methods offered rich, contextual perspectives, the findings are inherently subjective. They may not fully represent the broader views within stakeholder groups such as all T1D patients, clinicians, or hospital administrators.

Limited Sample Size and Diversity
The research involved a small cohort of interviewees and patient observations, with a focus on early adopters and participants already engaged in digital health trials. This skews findings toward tech-savvy users and may overlook perspectives from less digitally literate populations or minority groups.

Provotype-Driven Evaluation
The evaluation of Leefmaatje was based on early-stage provotypes and speculative design tools. Real-world functionality, long-term engagement patterns, and clinical outcomes were not tested in an operational setting, thus limiting the ability to assess practical feasibility and sustained impact.

Evolving Technology Landscape
AI-powered chatbots are evolving rapidly, especially with the introduction of large language models (LLMs). The technical feasibility, user trust, and regulatory requirements explored in this thesis could shift significantly with new tools, data privacy laws (e.g., AI Act, MDR), or societal attitudes toward AI in healthcare.

Implementation Complexity
Although this research proposes several strategic directions (e.g., hospital integration, insurer-led adoption), actual implementation is subject to complex interdependencies between data ownership, funding, technical capabilities, and institutional will. These were explored conceptually but not tested or validated at scale.

Ethical and Regulatory Assumptions
Assumptions were made about regulatory compliance (e.g., GDPR, MDR), data sharing between hospitals and third parties, and ethical chatbot behavior. However, these remain largely hypothetical and untested in a fully compliant live system.

8.2

Reflecting on Viability, Desirability & Feasibility

The goal of reflecting on viability, desirability, and feasibility is to holistically assess the proposed Leefmaatje concept—not just as a functional prototype, but as a real-world service with long-term potential across clinical, emotional, and systemic dimensions.

8.2.1 Viability

Leefmaatje demonstrates strong potential to improve healthcare delivery by saving clinician time, reducing redundant triage, and providing continuous support to patients. Its economic model aligns well with emerging reimbursement strategies mentioned in chapter 2 (p,42). However, its long-term success will depend on securing institutional buy-in, especially from hospitals and insurers, who must see its value not only in efficiency but in patient outcomes. A second critical factor is data governance, clear protocols around how patient data is collected, processed, and protected will be necessary for operational and ethical viability. Finally, the service concept delivers recognizable value to both patients and healthcare providers, ensuring its usefulness is felt at every level of the system, thus viability.

Looking ahead, potential long-term revenue streams could include integration into reimbursed care pathways, licensing to hospital networks, value-based contracting models with insurers, or public-private innovation partnerships. However, each of these models will require further validation and likely depend on ongoing co-development with stakeholders, especially as healthcare financing mechanisms evolve.

8.2.2 Desirability

Interviews and testing confirmed that patients genuinely appreciate the idea of having empathetic, reliable support between medical appointments.

They find comfort in a tool that can help manage day-to-day questions and uncertainties—particularly when that tool is designed to be non-clinical, friendly, and personalized. However, trust in such a system is fragile. There is a fine line between a helpful digital companion and a bot that feels like it's overstepping into areas meant for human care, such as emotional counseling or psychological support. To remain desirable, Leefmaatje must be designed to complement—not replace—human interaction. It should serve to empower users and enhance autonomy without pretending to replace the emotional nuance and judgment of a healthcare professional.

8.2.3 Feasibility

Integrating Leefmaatje into hospital systems and aligning it with data privacy laws like GDPR is technically achievable (outsourcing potentially but in collaboration with Hospital ICT) but operationally complex. This process would be made more feasible if hospitals are willing to contribute anonymized patient data for training purposes, enabling the chatbot to better understand common queries and context. In the early stages, personalization should rely on rule-based logic rather than sophisticated AI to manage complexity and mitigate risk. Additionally, the technical upkeep of the chatbot—particularly natural language processing and content governance may require external partnerships with tech providers or research institutions. As a stepwise strategy, launching Leefmaatje with specific, well-defined patient cohorts such as tech-savvy adolescents or patients using Freestyle Libre can help test, refine, and scale the service more safely and effectively.

8.3

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Use Of Chatgpt

This friend of mine (ChatGPT) has supported me in multiple ways throughout my process:

- Helped rephrase and refine scattered notes into coherent writing.
- Assisted in building rationales for concepts from fragmented insights.
- Played a key role in design fiction work — imagining speculative worlds and articulating future visions.
- Used for thematic analysis of interview data, helping cluster quotes into emergent themes.
- Served as a thinking partner during thesis development — clarifying ideas, expanding arguments, and stress-testing my assumptions.

Personal Reflection

Designing for a rapidly evolving and improving technological space—particularly one involving AI and healthcare—has been both challenging and deeply rewarding. It demanded not only academic rigor but also intuition, adaptability, and a degree of personal resilience. I found myself constantly navigating ambiguity, which, over time, sharpened my decision-making under uncertainty.

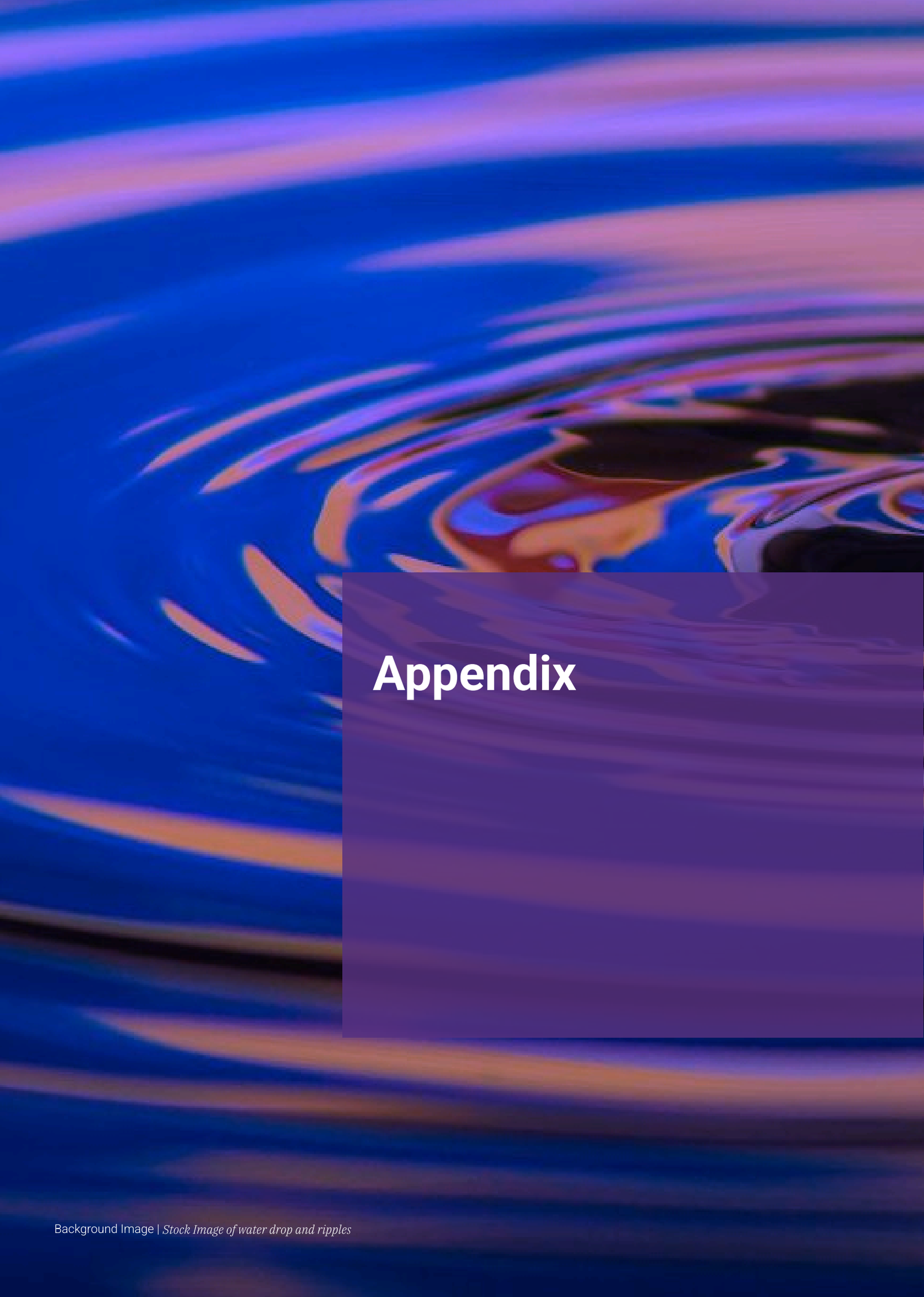
Working within the real-world constraints of designing something pragmatic and actionable for stakeholders—including hospitals, insurers, and patients was incredibly grounding. Rather than feeling restricted, these boundaries became productive drivers for creativity. They pushed the project toward solutions that weren't just speculative but implementable and genuinely useful. Iterative development and validation through frequent user and stakeholder feedback proved vital both to the design outcome and to my own growth as a designer.

In many ways, this project reflects how I work and who I am. It's about bridging gaps, synthesizing insights across fields, and holding space for both optimism and skepticism. It's about thinking systemically while staying close to the user's lived experience. The outcomes feel authentic because they are an extension of how I think analytical yet intuitive, structured yet flexible.

This thesis also made me reflect on the role of process. I've come to see process not as a rigid framework, but more like a care pathway in chronic disease management: it doesn't cure the problem on its own, but it creates the conditions for continuous improvement, better decisions, and adaptive support. Just as a well-designed treatment protocol supports both patients and practitioners without replacing clinical judgment, a thoughtful design process scaffolds creativity, helping it thrive in complex, evolving environments. It provides consistency where needed, but leaves room for intuition, experimentation, and breakthroughs.

Ultimately, my time at TU Delft has been transformative. This thesis feels like more than just a capstone project; it's a culmination of personal, academic, and professional growth. It's not just a product it's a process I lived, and one I'll carry forward.

Appendix



Background Image | *Stock Image of water drop and ripples*

A Project Brief

TU Delft

IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name	[redacted]
Initials	
Given name	
Student number	

IDE master(s)	IPD ☐ DfI ☐ SPD ✔
2nd non-IDE master	
Individual programme *(date of approval)*	
Medisign	☐
HPM	☐

SUPERVISORY TEAM

Fill in he required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	[redacted]	dept./section	[redacted]
mentor		dept./section	
2nd mentor			
client:			
city:		country:	Netherlands
optional comments			

! Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.

! Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.

! 2nd mentor only applies when a client is involved.

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in **by the Chair** of the supervisory team

Sign for approval (Chair)

Name [redacted] Date [redacted] Signature [redacted]

CHECK ON STUDY PROGRESS

To be filled in **by SSC E&SA** (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total _____ EC

Of which, taking conditional requirements into account, can be part of the exam programme _____ EC

★	**YES**	all 1st year master courses passed
	NO	missing 1st year courses

Comments:

Sign for approval (SSC E&SA)

Name [redacted] Date [redacted] Signature [redacted]

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	★	Supervisory Team approved
NO		Supervisory Team not approved

Comments:

Based on study progress, students is ...

★	**ALLOWED** to start the graduation project
	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Name [redacted] Date [redacted] Signature [redacted]

Personal Project Brief – IDE Master Graduation Project

Name student	[redacted]	Student number	[redacted]

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title Bridging Innovation, Monetization, and System Integration in healthcare: Implementation of AI-Powered Self-Management Chatbots

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

The central aim of this thesis is to explore and support implementation of self-management chatbots with creation of business propositions bridging the gap between solution, implementation and dutch healthcare systems. By that, helping Health Innovation Labs understand the risks and benefits of the bot's implementation in different systems and stakeholders involved to help make informed decision for such bot's implementation and it's monetization.
This project takes place in the domain of chronic care management, a critical challenge in the Dutch healthcare system due to increasing multimorbidity, and rising costs. At its core, this research explores the implementation of AI-powered self-management chatbots, aiming to bridge the gap between innovative solutions and sustainable integration within healthcare ecosystems.
The primary stakeholders include patients with chronic conditions, healthcare professionals, health insurers health innovation labs, and their coalition. Patients stand to benefit from enhanced self-management support, while healthcare providers may experience more efficient workflows and reduced burden. Health innovation labs seek to evaluate the risks and benefits of chatbot adoption within different healthcare systems (inside, outside and in between), ensuring alignment with regulatory frameworks and or reimbursement models.
This domain offers significant opportunities for AI-driven innovation. A well-implemented chatbot can provide 24/7 personalized guidance, improve patient adherence, and enhance communication between patients and healthcare professionals. However, successful integration requires addressing key challenges, including financial sustainability, and compatibility with reimbursement and or funding structures.
By developing business propositions that consider both the technological and economic dimensions of implementation, this research supports informed decision-making for stakeholders. It seeks to clarify viable monetization models, reduce uncertainties around adoption, and ensure that AI-driven self-management tools become a sustainable and impactful addition to chronic care.

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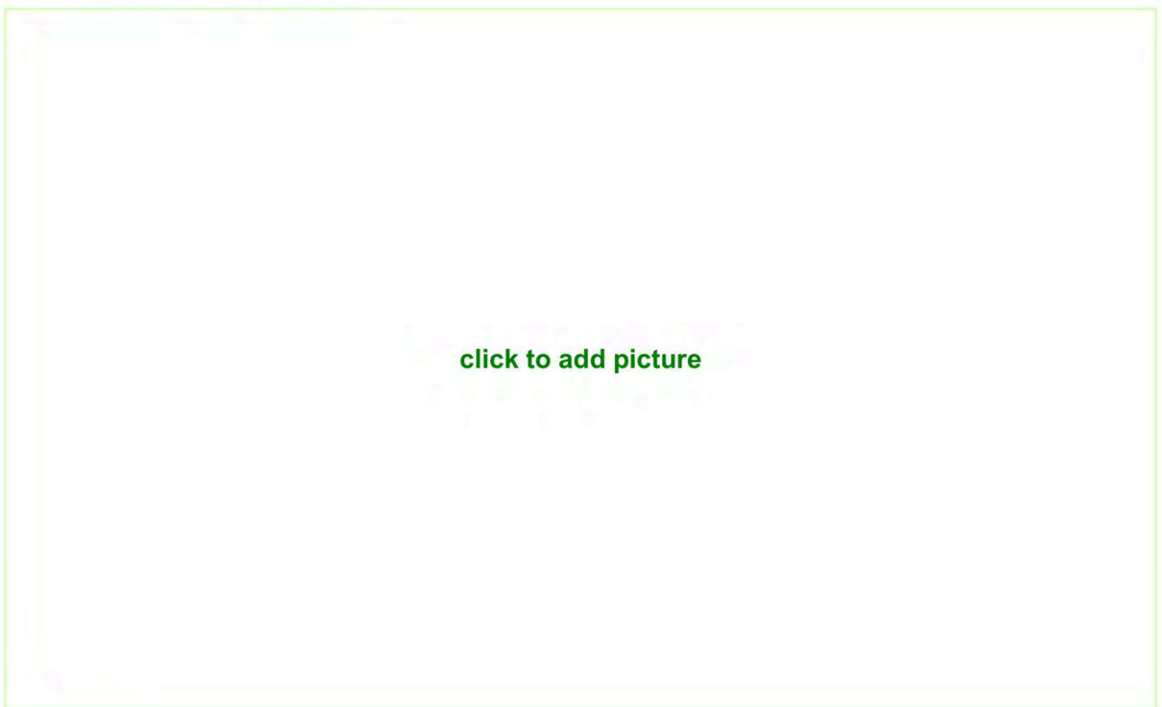

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image / figure 2

Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)

The core challenge lies in ensuring the financial sustainability and seamless integration of AI-powered self-management chatbots within the Dutch healthcare system. While these assistants have the potential to enhance chronic care by supporting patient self-management and reducing the burden on healthcare providers, their widespread adoption depends on alignment with existing reimbursement structures and the development of a viable business model. Without clear pathways for funding and integration, these innovations risk remaining underutilized or inaccessible.
Within the 100-working-day timeframe, this project will focus on two key questions:
What business models can ensure the financial sustainability of an AI-powered self-management chatbot while aligning with existing healthcare financing and reimbursement mechanisms to enable integration into chronic care pathways?

By addressing this questions, this research will provide strategic insights for health innovation labs, healthcare providers, and other organisations. The goal is to create actionable business propositions that mitigate adoption risks, support informed decision-making, and facilitate the sustainable implementation of AI-driven self-management solutions in chronic care.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Investigate and create viable business propositions for the implementation of an AI-powered self-management chatbot in Dutch chronic care, ensuring financial sustainability with a probable alignment with existing healthcare reimbursement models.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

To address the research questions, this project will follow a structured approach combining qualitative research, business modeling, and stakeholder validation.

Contextual research will be conducted through literature reviews and expert interviews to map the Dutch healthcare financing landscape, reimbursement mechanisms, and existing AI healthcare implementations.
Next, business model exploration will use frameworks such as the Business Model Canvas and Value Proposition Design to identify viable revenue models that balance financial sustainability with accessibility for patients.
Stakeholder input is crucial, so co-creation workshops and semi-structured interviews with healthcare providers, policymakers, insurers, and health innovation labs will be conducted to refine and validate business propositions.
And, a feasibility assessment will evaluate the proposed models based on regulatory fit, economic viability, and may be scalability. The results will offer strategic recommendations for sustainable chatbot implementation in chronic care.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a ***kick-off meeting****,* ***mid-term evaluation meeting****,* ***green light meeting*** *and* ***graduation ceremony****. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).*

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	18-02-2025
Mid-term evaluation	22-04-2025
Green light meeting	1-07-2025
Graduation ceremony	4-08-2025

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	✔
For how many project weeks	20
Number of project days per week	4

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

This project excites me because it aligns with my interest in using technology to address real-world challenges in healthcare. It also provides an opportunity to explore the intersection of strategic design and AI innovation with complex ecosystem of healthcare. The topic allows me to work on impactful solutions for chronic care management, combining stakeholder-centered approaches with considerations—a direction I find both valuable and personally meaningful.
Competencies I Want to Prove or Develop:
1. Strategic Design: Applying methods like systems mapping and co-creation to develop actionable strategies.
2. Qualitative Research: Conducting expert and stakeholder interviews and analyzing insights to inform business decisions.
3. Healthcare Ecosystem Understanding: Gaining in-depth knowledge of financing structures and reimbursement mechanisms in chronic care.
4. Revenue Model Development & value propositioning: Exploring sustainable business models that align with user needs and system constraints.
Personal Learning Ambitions:
1. Deepening my understanding of healthcare financing systems.
2. Exploring how AI solutions can be integrated sustainably into complex ecosystems.
3. Enhancing my ability to synthesize insights into strategic recommendations.
4. Expanding my professional network within the healthcare innovation domain.

B Stakeholder semi-structured Interview Guide

Interviewee: (Name / Group)
Date: (DD/MM/YYYY)
Role/Position:
Stakeholder Type:

1. Power & Influence
- How do you currently manage your condition on a daily basis?
- Do you participate in any communities (online or offline) related to your condition?
- Do you feel your voice is heard in shaping health tools or services?
- How do you see your influence on others (e.g., peers, community members)?

2. Interests & Needs
- What are your biggest challenges in managing your condition?
- What features or support would make a tech tool truly helpful for you?
- What would an ideal digital health companion look like in your daily life?

3. Attitudes & Emotions
- How do you feel about AI/chatbots being used in healthcare support?
- Have you tried similar tools before? What was your experience?
- What would make you trust or abandon such a tool?

4. Concerns & Risks
- What worries you about using AI or digital health apps?
- Are there things that would make you feel misunderstood or unsupported?
- What would cause you to stop using a tool like this?

5. Preferences & Personalization
- How important is personalization to you in health tools?
- What kind of tone, language, or content style works best for you?
- How would you like to be involved in shaping this service?

6. Final Reflections
- What would success look like for you if you used this tool regularly?
- Any features, behaviors, or values this tool must have to be valuable?
- How could we best involve people like you moving forward?

C Stakeholder Analysis

Users & Stakeholders

The Patient

Section	Details
Stakeholder Name/Group	[redacted]
Date of Interview	
Position/Role	
Stakeholder Type	
1. Power Dynamics	
Key Influence Factors	Firsthand experience with daily diabetes management. Often contributes informally to forums, reviews, or community content. Emotional authority as someone directly affected *May influence others' app adoption through social or community channels*
Current Level of Influence	Moderate (indirect but powerful) While not institutionally influential, T1D patients determine real world success or failure of the service through sustained usage and feedback.
Perceived Role in Relation to Others	Sees self as the one most impacted by tech, but least included in system decisions. Wants to be heard and respected as a collaborater, not a passive recipient
2. Interest & Expectations	
Key Interests/Concerns	Better emotional support for diabetes burnout Daily help with habits (insulin reminders, nutrition, mental health check ins) Trustworthy & reliable information without overwhelming jargon and available 24*7 Personalization that reflects their story, not generic averages Sceptic, first tests if the bot gives answer she already has answers to thou provided through hospitals.
Alignment with Project Goals	High Values AI and tech that simplify life, reduce stress, and give control. Strong alignment if Leefmaatje stays grounded in real user needs and personalisation.
What They Hope to Achieve	Easier, more manageable daily care Relief from isolation and overwhelm Tech that understands mood swings, lifestyle gaps, and fluctuations Being seen and supported, not just "managed"
3. Attitudes & Emotions	
General Attitude Toward the Project	Cautiously optimistic Interested but skeptical. Will support it if it's truly useful and respectful, would like it to integrated in the services/care which they already pay for.
Positive or Negative Emotions	Hopeful for real help Frustrated by previous apps that were either too clinical or too superficial Tired of being a "data point" without emotional recognition
Potential for Change in Attitude	High variability Adoption and sentiment depend on whether the tool delivers real value and feels genuinely supportive.

4. Concerns & Barriers	
Challenges They See in the Project	Generic advice or lack of personalization. Fear of judgment or misunderstanding emotional lows, being confronted by a bot??? Lack of real integration with their care team
Potential for Resistance	Moderate Will abandon the service quickly if it feels impersonal, irrelevant, or untrustworthy.
Possible Solutions	Use adaptive, empathic tone and personalized journey paths. > Patient profiling? Let users set preferences (tone, content type, notification level) Ensure data transparency and give user control. Offer ways to connect with peers or care team when needed.
5. Stakeholder Sentiment	
Overall Sentiment	Cautious support Willing to engage but with high standards for empathy, trust, and utility.
Key Factors Influencing Sentiment	How emotionally aware and non judgmental the chatbot is How clearly it helps in real life challenges Clarity of data handling and respect for boundaries or data integration Feeling of empowerment, not surveillance
6. Action Plan	
Engagement Strategy	Involve patients in user testing and iterative design Provide opt in customization paths Embed language that feels affirming, not instructive Offer quick wins
Key Steps to Maintain Relations	Build a visible feedback loop Create a patient led advisory panel in coordination with patient association
Plan for Managing Resistance	Don't overpromise Show real empathy through design and content tone Give users agency Address the emotional side of diabetes care as seriously as the physical side

Family Members

Section	Details
Stakeholder Name/Group	Parent
Date of Interview	[redacted]
Position/Role	Parent of adolescent boy with type 1 diabetes from early childhood
Stakeholder Type	Enabler & Guardian High emotional and operational investment; deeply involved in daily care and decision making; bridge between healthcare professionals and the patient.
1. Power Dynamics	
Key Influence Factors	Often present at diagnosis and during care transitions Controls access to tools, apps, and treatment for minors Emotional and financial gatekeeper Their stress, trust, or overwhelm can shape tool adoption
Current Level of Influence	High (for younger patients) Decisions on tech, education, diet, and tools often rest with parents. Their lived insight shapes early routines and coping strategies.
Perceived Role in Relation to Others	Supporter and safety net, but often feels undertrained and emotionally overwhelmed Walks the line between protecting independence and ensuring safety especially during transitioning from minor care to adult.
2. Interest & Expectations	
Key Interests/Concerns	Empowering the child to live a normal, happy life with diabetes Reducing emotional friction in the relationship (nagging, control, resentment) Tools that reduce mental overload and constant vigilance Trustworthy, accessible info that adapts to real time behavior Less dependency on fear based guidance from clinicians
Alignment with Project Goals	Very High Deeply aligned if Leefmaatje supports emotional development, autonomy building, and provides proactive, situation aware guidance.
What They Hope to Achieve	A more confident, independent child A relationship that is not solely defined by diabetes care Clear, non patronizing education Early identification of emotional or behavioral risks Insights that replace fear with understanding
3. Attitudes & Emotions	
General Attitude Toward the Project	Hopeful and curious, but protective Wants tools that are credible, trustworthy, and don't manipulate user data or increase guilt/fear.
Positive or Negative Emotions	Hope that tech can fill care gaps Exhaustion from the hidden work of caregiving Frustration with fragmented systems and shallow education Anxiety around long term well being and emotional development
Potential for Change in Attitude	Medium High Positive if Leefmaatje reduces burden and supports trust building; negative if it adds noise, complexity, or feels like surveillance.
4. Concerns & Barriers	
Challenges They See in the Project	Generalized education that doesn't fit their child's needs Being overwhelmed with alerts or too much info

	Stigma around "controlling the child" or friction in parent child dynamic Lack of integration into doctor patient dialogue Poor reimbursement or tool affordability
Potential for Resistance	Moderate Will resist if the tool isn't intuitive, emotionally supportive, or doesn't visibly empower their child to grow.
Possible Solutions	Include family view modes or co pilot features with shared insights Allow personalization of tone, depth, and frequency of education Highlight child agency and growth, not just compliance Make emotional well being visible (e.g., "Happy Time in Range") Secure, ethical, parent aware data policies
5. Stakeholder Sentiment	
Overall Sentiment	Hopeful Enabler Looking for support, not more responsibility. Believes the right tool could reduce friction, build confidence, and improve quality of life.
Key Factors Influencing Sentiment	How it helps in real situations like school, travel, sports Whether it can create space for less tension at home How it respects the growing independence of their child Affordability and whether it's recognized by the system (insurance, schools, doctors)
6. Action Plan	
Engagement Strategy	Involve in family focused co creation and onboarding flow Provide flexible family tools (e.g., parental oversight with child autonomy sliders) Use storytelling in onboarding to show real families navigating growth Address fears directly (e.g., "How do I let go without stepping away?")
Key Steps to Maintain Relations	Reinforce that the tool supports parenting, not replaces it Create evidence based emotional tracking to reassure parents Communicate the app's empathy first approach Offer optional features for parents during transition periods (e.g., diagnosis, teenage years)
Plan for Managing Resistance	Don't guilt or pressure; show how the app supports both child and parent Avoid techno optimism be real about limitations and scope Respect family dynamics and autonomy tensions with flexible features Be transparent about how data supports well being, not just disease management

Healthcare Providers

Section	[redacted]
Stakeholder Name/Group	
Date of Interview	
Position/Role	
Stakeholder Type	Saviour High influence through direct patient contact and technical knowledge, high interest in sustainable care innovation, supportive attitude
1. Power Dynamics	
Key Influence Factors	Works directly with patients using technical devices; interprets and integrates technology into clinical care; has autonomy in specific procedures and bridging clinical engineering gap; point of contact for tech related patient queries.
Current Level of Influence	Medium High Influences patient experience, device use, and system understanding; contributes to shaping technological implementation practices within the department.
Perceived Role in Relation to Others	Acts as a translator between medical and technological domains; ensures patients and clinicians understand and effectively use devices; reduces mismatch in expectations and usage.
2. Interest & Expectations	
Key Interests/Concerns	Supporting effective self management, reducing unnecessary consultations, improving understanding of device use, addressing user stress, improving care quality, and personalizing advice.
Alignment with Project Goals	Strong Advocates for using technology to reduce care burden while improving patient autonomy and precision in support.
What They Hope to Achieve	Shift toward telemonitoring and fewer, more meaningful consultations; prepare patients better for appointments; reduce repetitive low value contact moments.
3. Attitudes & Emotions	
General Attitude Toward the Project	Supportive especially toward chatbot use for repetitive, educational queries and patient preparation; cautious about ethical and safety boundaries.
Positive or Negative Emotions	Optimistic but critical sees strong potential if personalization, ethical limits, and integration with care paths are respected.
Potential for Change in Attitude	Highly adaptive as long as evidence supports it and safety limits are in place; encourages balance between tech empowerment and real human oversight.
4. Concerns & Barriers	
Challenges They See in the Project	Elderly patients' discomfort with digital tools; risk of de personalization; chatbot over promising or providing generic responses; ethical boundaries of decision making; unclear placement inside or outside the care system.
Potential for Resistance	Moderate mostly on institutional trust and emotional readiness; believes both healthcare professionals and patients need education to adapt to chatbot integration.
Possible Solutions	Educate both patients and professionals on chatbot use; set clear ethical and medical boundaries; integrate chatbot partially within hospital system; allow chatbot to support but not replace human interaction; personalize based on patient profile (age, type of diabetes, comorbidities).

5. Stakeholder Sentiment	
Overall Sentiment	Supportive sees chatbot as beneficial for scalable, routine support; emphasizes caution and context based use.
Key Factors Influencing Sentiment	Belief in technical solutions, strong understanding of user challenges, concern for personalization, and patient empowerment; wants care quality to improve through smarter allocation of professional time.
6. Action Plan	
Engagement Strategy	Involve in defining chatbot use boundaries; consult for personalization logic; co design boundary setting process for clinical hand off; include in prototyping/testing with patients.
Key Steps to Maintain Relations	Invite to co creation session; share chatbot development updates; engage on topics of patient device interaction, personalization, and education; involve in defining metrics to assess success.
Plan for Managing Resistance	Position chatbot as complementary; build trust through transparent function boundaries; offer examples of reduced workload and improved care; use role based access and limitations; focus chatbot on educational/preparatory/FAQ type queries.

Section	Details
Stakeholder Name/Group	Dr. Bas Schouwenberg
Date of Interview	March 18, 2025
Position/Role	Internist specialized in clinical pharmacology; focuses on diabetes care for both adults and adolescents
Stakeholder Type	Friend (Supportive, engaged, open to innovation)
1. Power Dynamics	
Key Influence Factors	Expertise in clinical pharmacology and internal medicine; involved in transitional care (adolescent to adult); academic and clinical involvement; active in multidisciplinary and innovation driven initiatives.
Current Level of Influence	High Directly shapes care pathways for adolescents; involved in innovation in care delivery and education.
Perceived Role in Relation to Others	Sees himself as a connector between pediatric and adult diabetes care; supports interdisciplinary work and collaborative approaches to care innovation.
2. Interest & Expectations	
Key Interests/Concerns	Ensuring smoother adolescent transitions, supporting effective self management, preventing redundancy in care, providing accessible and developmentally appropriate education.
Alignment with Project Goals	Strong Direct interest in tools that reduce workload, empower patients, and improve transitions aligns well with the project's chatbot objectives.
What They Hope to Achieve	Improved patient independence, higher quality consults, better access to information, lower frequency of redundant visits, and collaborative educational models that include families and care teams.
3. Attitudes & Emotions	

General Attitude Toward the Project	Backer Thoughtfully supportive and interested in real world implementation and results.
Positive or Negative Emotions	Optimistic about reducing workload and improving patient experience; minor concerns about public trust in bots and ensuring response quality.
Potential for Change in Attitude	Positive Will likely become more enthusiastic if the chatbot demonstrates real world reliability, adaptability, and value in adolescent care contexts.
4. Concerns & Barriers	
Challenges They See in the Project	Ensuring chatbot trust and uptake; adolescents struggling with compliance, motivation, or mental health issues; ensuring cultural and language accessibility; avoiding misinformation or confusion caused by chatbot responses.
Potential for Resistance	Low Will remain supportive if concerns like data safety and medical accuracy are addressed.
Possible Solutions	Collaborate with trusted clinicians and institutions; ensure chatbot responses are medically vetted; create adaptive, personalized education modules; involve psychosocial supports like peer and family engagement.
5. Stakeholder Sentiment	
Overall Sentiment	Strong backer
Key Factors Influencing Sentiment	Interest in adolescent self management support, belief in care innovation, potential for collaborative care models and digital transformation, and academic curiosity in chatbot generated data for research.
6. Action Plan	
Engagement Strategy	Involve in co creation efforts, particularly around adolescent education and transition planning; keep informed through results and pilot updates; position as a strategic champion for innovation within the hospital.
Key Steps to Maintain Relations	Acknowledge input and impact; share pilot outcomes that validate his concerns; offer co creation recognition or authorship; align chatbot development with his clinical and teaching goals.
Plan for Managing Resistance	Ensure chatbot answers are medically reliable and culturally sensitive; co design use case boundaries; be transparent about data use, scope, and feedback loops for refinement.

Hospital

Section	[redacted]
Stakeholder Name/Group	
Date of Interview	
Position/Role	
Stakeholder Type	Saviour (high power, high interest, supportive with strategic caution)
1. Power Dynamics	
Key Influence Factors	Strategic and financial authority at HIL; experience in process innovation, concept development, and partnerships; works within hospital wide strategy team; links across innovation, research, and patient care domains.
Current Level of Influence	High strategic role, deeply embedded in innovation management; connected with board level stakeholders, researchers, and IT departments.
Perceived Role in Relation to Others	Facilitator and enabler of innovation; not an end owner of products but guides them through incubation, concept development, and value realization phases.
2. Interest & Expectations	
Key Interests/Concerns	Sustainable innovation; ensuring projects have business cases and clear ownership; avoiding "ownerless" concepts; improving quality of care without increasing costs or time burden; focus on desirability, viability, feasibility.
Alignment with Project Goals	Strong alignment with project goals focused on patient empowerment, digital solutions, and integrated innovation in healthcare.
What They Hope to Achieve	A viable, owned, sustainable service model for the chatbot; support for experimentation that leads to a measurable impact on care quality, efficiency, or cost.
3. Attitudes & Emotions	
General Attitude Toward the Project	Supportive, thoughtful, and strategically critical; emphasizes practical barriers and learning from past experiences (e.g., "Susan" chatbot project).
Positive or Negative Emotions	Encouraging but cautious; sees potential in the chatbot but stresses the importance of ownership, sustainability, and system alignment.
Potential for Change in Attitude	Open to adaptation, especially if ownership and value are clearly defined and early experimentation yields promising results.
4. Concerns & Barriers	
Challenges They See in the Project	Lack of a clear owner or entrepreneur to adopt and sustain the chatbot; difficulty integrating with complex hospital systems; regulatory and data challenges; behavioral barriers from both patients and providers.
Potential for Resistance	High if business case and ownership are unclear; institutional reluctance without strong evidence or alignment with existing departments and systems; digital illiteracy among stakeholders.
Possible Solutions	Build a strong evidence base through phased experiments; co create with internal departments; position chatbot as supportive, not disruptive; involve valorization and IT early; explore external ownership models (startups/licensing).
5. Stakeholder Sentiment	

Overall Sentiment	Strategic backer; not emotional or enthusiastic but invested in well grounded innovation with institutional fit.
Key Factors Influencing Sentiment	Past project failures (e.g., Susan chatbot); institutional complexity; business model risks; innovation strategy alignment; lack of current measurable impact.
6. Action Plan	
Engagement Strategy	Keep informed with updates; involve in co creation and strategic planning; align with DVF (Desirable, Viable, Feasible) model; offer ownership alternatives like start up pathways or valorization partnerships.
Key Steps to Maintain Relations	Share pilot outcomes and stakeholder mapping progress; involve in co creation session if relevant; provide transparency on evolving business case; stay within ethical/legal boundaries (AI Act, MDR).
Plan for Managing Resistance	Address lack of measurable results with phased validation; present evidence of care efficiency or quality improvement; frame chatbot as augmenting not replacing existing workflows; collaborate with business innovation teams.

Patient Associations

Person 1

Section	Details
Stakeholder Name/Group	[redacted]
Date of Interview	
Position/Role	
Stakeholder Type	Saviour (high power through knowledge & advocacy, high interest, supportive attitude)
1. Power Dynamics	
Key Influence Factors	Deep lived experience, academic background in medicine and diabetes research, public educator, bridges patients and professionals, involved in co creation projects.
Current Level of Influence	High Influences DVN direction, communicates with multiple stakeholders, has credibility in both patient and professional spaces.
Perceived Role in Relation to Others	Sees herself as a connector across systems (patient, organization, hospital). Emphasizes importance of matching doctors to patients and tailoring support.
2. Interest & Expectations	
Key Interests/Concerns	Improving patient education, facilitating better collaboration between stakeholders, promoting patient centered care, ensuring sustainable implementation of chatbot tools.
Alignment with Project Goals	Strong alignment. Advocates for tools that empower patients and reduce unnecessary strain on healthcare providers.
What They Hope to Achieve	Better patient self management, more meaningful healthcare contacts, seamless integration of tools like chatbots into existing care, greater public trust in digital tools.
3. Attitudes & Emotions	
General Attitude Toward the Project	Supportive sees great value in chatbot integration, particularly in patient education, preparation for appointments, and mental health support.
Positive or Negative Emotions	Hopeful but realistic. Feels chatbot integration could meet unmet needs but is cautious about trust, tone, and clarity in its purpose.
Potential for Change in Attitude	Highly open and adaptive suggests multiple potential integrations and openly discusses limitations and ways to overcome resistance.
4. Concerns & Barriers	
Challenges They See in the Project	Resistance from users who believe they know everything or fear confronting their knowledge gaps; trust issues if not associated with a medical institution; financial limitations for integration and maintenance.
Potential for Resistance	Moderate not personal resistance, but expects resistance from other stakeholders and patients due to psychological barriers and institutional rigidity.
Possible Solutions	Position chatbot as a support tool rather than expert; allow co branding with hospitals to increase trust; use chatbot as preparation/education tool rather than diagnosis engine.
5. Stakeholder Sentiment	

Overall Sentiment	Strong backer with critical insights. Proactive, thoughtful, and highly supportive of innovation.
Key Factors Influencing Sentiment	Belief in personalization, strong advocacy for patient autonomy, experience with systemic inertia in healthcare and patient orgs.
6. Action Plan	
Engagement Strategy	Involve in co design and pilot testing of chatbot; ensure visibility of DVN in implementation; use Judith as a liaison figure in organizational and hospital discussions.
Key Steps to Maintain Relations	Provide regular updates; seek feedback during each milestone; credit DVN's contributions; include her in dissemination efforts.
Plan for Managing Resistance	Frame chatbot as a flexible support tool, not a replacement; offer patient testimonials and demos; communicate boundaries of advice clearly.

Person 2

Section	**Details**
Stakeholder Name/Group	Edwin (Affiliated with Tech Lab)
Date of Interview	8th April 2025
Position/Role	Healthcare innovation advocate; works on tech integration in health systems; also have caregiver (Parent) & personal experience
Stakeholder Type	Saviour Visionary and systems oriented thinker with high strategic influence and deep alignment
1. Power Dynamics	
Key Influence Factors	Drives innovation discourse; bridges patient tech clinician gaps; brings behavioral and emotional perspectives to digital health; likely has access to healthcare innovation networks.
Current Level of Influence	High Shapes thought leadership in tech enabled healthcare and has the potential to influence both institutional and system level conversations.
Perceived Role in Relation to Others	Acts as a systemic critic and reformer; seeks to unify the needs and perspectives of patients, caregivers, developers, and clinicians.
2. Interest & Expectations	
Key Interests/Concerns	Moving from reactive to proactive care models; behavior based care; emotionally resonant tech; personalization and empowerment of both patients and caregivers; systems level reform.
Alignment with Project Goals	Strong Deeply aligned with the project's ambition to build emotionally intelligent, AI enabled support tools.
What They Hope to Achieve	Digitally supported systems that reduce burden, foster empathy, and empower patients/caregivers; real integration into value based care; personalization that adapts to the emotional and behavioral realities of users.
3. Attitudes & Emotions	

General Attitude Toward the Project	Strong backer Views chatbot as a potential catalyst for systemic change.
Positive or Negative Emotions	Optimistic and empathic, but critical of the current reactive system and commercial misuse of health data.
Potential for Change in Attitude	Stable Unlikely to withdraw support unless the project becomes superficial or fails to address system integration, emotional depth, and ethical design.
4. Concerns & Barriers	
Challenges They See in the Project	Data overload and poor data usage; systemic flaws in reimbursement and value models; risk of superficial tools that don't understand emotional nuance; commercialization of health data without user value.
Potential for Resistance	Low May challenge the direction critically if the solution doesn't meet ethical or behavioral depth expectations.
Possible Solutions	Ensure deep personalization and behavioral relevance; position chatbot as a system integrated solution, not an add on; uphold transparent data ethics; measure value in terms of real world patient outcomes and empowerment.
5. Stakeholder Sentiment	
Overall Sentiment	Strong backer
Key Factors Influencing Sentiment	Belief in human centered technology; advocacy for emotionally intelligent care; personal understanding of care gaps; desire for systemic healthcare reform that centers patient value and agency.
6. Action Plan	
Engagement Strategy	Involve in strategic design and co creation; consult on behavioral and value based design frameworks; use as a sounding board for emotional tone and systemic framing.
Key Steps to Maintain Relations	Keep transparency high around goals and data usage; validate input by integrating into design logic; invite to advisory roles or cross stakeholder dialogue.
Plan for Managing Resistance	Avoid superficial design; focus on system relevant use cases and emotionally intelligent support; communicate the tool's real world value and evidence of effectiveness clearly.

There are more stakeholders, the more you discover the more stakeholders come up. Also thing with stakeholders is there is not one person who calls the shots so there is possibility of you getting redirected to different person for some parts of the stakeholders. Plus there is a complexity when it comes to healthcare as there are different entities and within them there are different stakeholders or different stakeholders need to come together to form the entity.

Another issue identified was the insights formed are highly subjective from the interviews and may not be generalized for a stakeholder or entity.

D Patient Journey & Information flow Mapping

Life Events

Knowledge Transfer

Patient Experience

Gaps

Diagnosis

Constrained by working hours

"I felt scared, but they helped us breathe. They made space for our questions."

"My internist was more interested in what makes me click and then helped me prepare accordingly....I really liked her approach"

" They took me step by step and tried their best to not overwhelm me"

" I am grateful that we as a family were able to take part in this condition management together....that helps me feel I am not alone"

" I am happy that I have mental health support as T1D has been very life turning event and I was just shutting off after this reality hit me"

"I did not understand what happened! I closed my eyes and next I know I was in ICU....surrounded by doctors"

"I was scared, the setting was intense. And results could have been fatal"

"It felt like the doctor was telling me horror story"

"My life changed....it felt like I lost my freedom to live, I was handed over rules to stay alive"

"It was like a firehose of rules. We left more confused than when we came in."

"The situation was stressful for everyone! but felt that it could have been better....than giving me a death sentence"

"....everyone is worried, this changes everything"

- Fear-based communication sometimes without emotional scaffolding
- Info overload for patients/parents with no time to process
- Generalized education that lacks personalization
- ICU or crisis-based entry into care without soft landing afterwards

Onboarding

"I am able to gradually learn the basics of carb counting and CGMs ....soon it will come natrually"

" Docs call this honeymoon period....but I think it is easy cause right now"

" I always have alot to talk about with my internist, and the nurses"

" I feel like going regularly!"

"The association really helped me and I feel supported, I always reach out to them to know more form their experience"

"There is more to life than just T1D and my HCP understand this...."

"Everyone is so involved...the support is good"

"It was like a firehose of rules. We left more confused than when we came in."

"I understand the rules and what I need to everyday to survive....but somethings don't fir my life....felt like generalised advice"

"I felt I was informed by different HCP's a bit extensive"

"I was felt sometimes....like I did not know what to expect"

"They assumed one info session was enough. It wasn't"

"My dad would check at odd times in the night if I am okay and sleeping well....which felt sad"

"The basic management is easy to understand but is a lot of effort"

- One-size-fits-all educational materials; no age/ lifestyle adaptation
- Lack of structured, ongoing follow-up or phased learning
- Parents unsupported in their new caregiving roles
- No peer or mentor connection in early stages
- Technical and emotional questions often go unanswered

Adjustmen

" I am able to gradually learn the basics of carb counting and CGMs .....soon it will come natrually"

" Docs call this honeymoon period....but I think it is easy cause right now"

" I always have alot to talk about with my internist, and the nurses"

" I feel like going regularly!"

"The association really helped me and I feel supported, I always

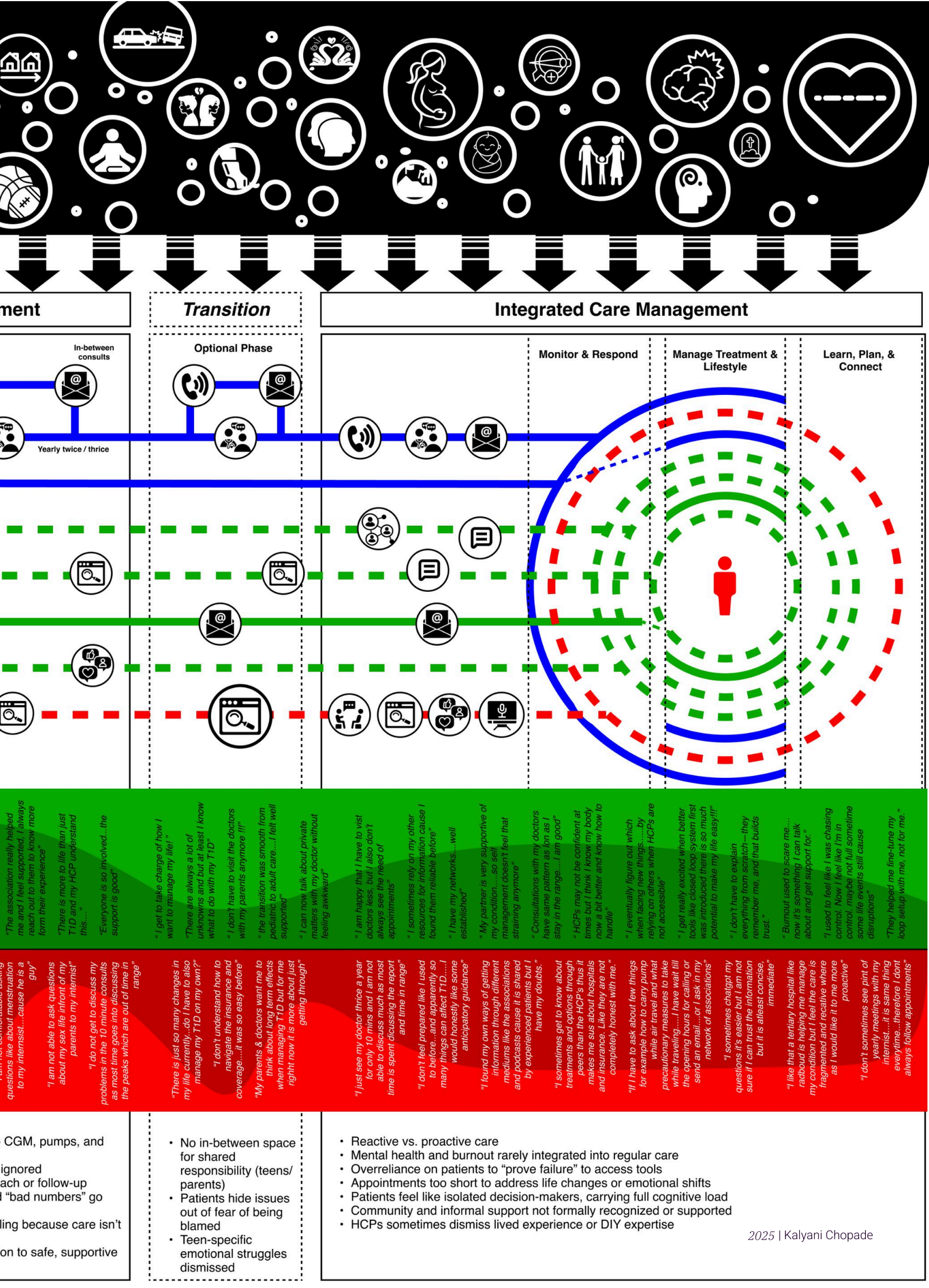
"If something is not working I have to prove that it's failing untill failure to get access to better tools"

"I get still get questions out of stress in the middle of the night and I can't reach hospital"

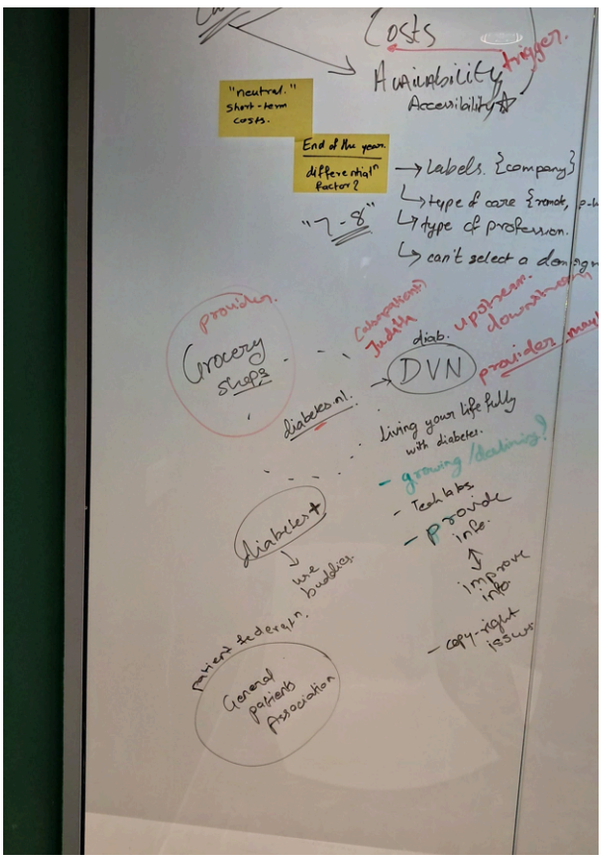
"I don't feel a lot of public spaces example schools or even work spaces are inclusive to my condition"

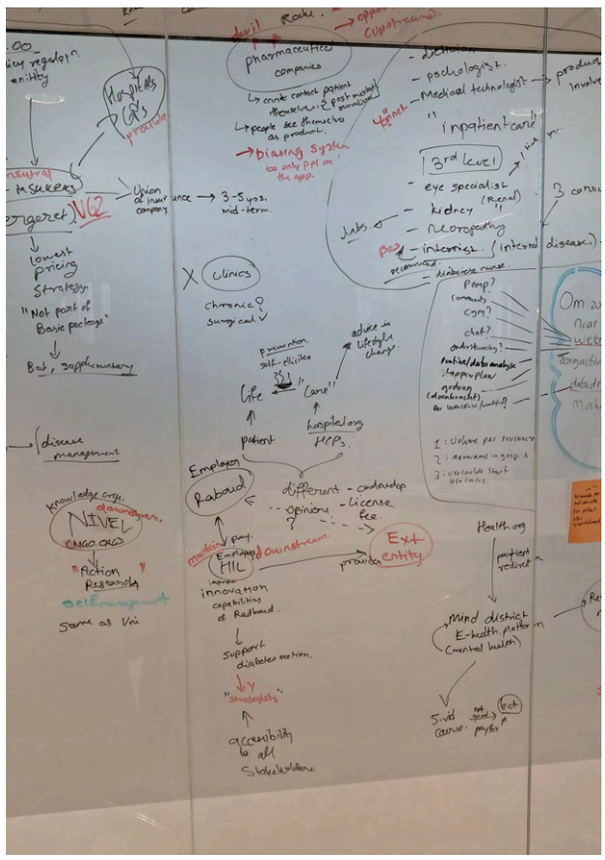
"I am not comfortable asking questions like about menstruation to my internsist....cause he is a

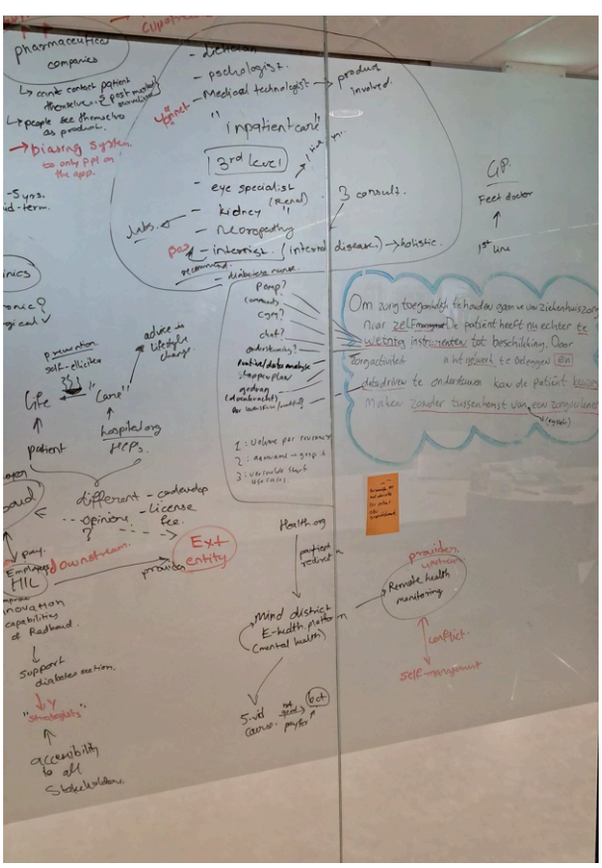
- Bureaucratic barriers to CGM tech access
- Nighttime hypo anxiety ignore
- Minimal proactive outreach or
- Shame and fear around "bad unaddressed
- Patients resort to Googling be accessible
- No structured introduction to s communities

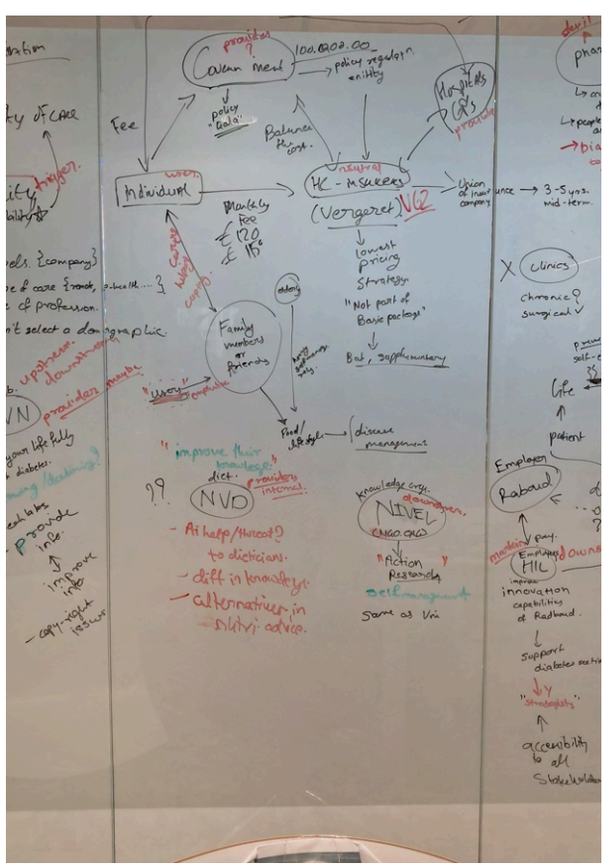

ment
Transition
Integrated Care Management
In-between consults
Optional Phase
Monitor & Respond
Manage Treatment & Lifestyle
Learn, Plan, & Connect
Yearly twice / thrice
"The association really helped me and I feel supported, I always reach out to them to know more form their experience"
"There is more to life than just T1D and my HCP understand this..."
"Everyone is so involved...the support is good"
"I get to take charge of how I want to manage my life!"
"There are always a lot of unknowns and but at least I know what to do with my T1D"
"I don't have to visit the doctors with my parents anymore !!!"
"the transition was smooth from pediatric to adult care....I felt well supported"
"I can now talk about private matters with my doctor without feeling awkward"
"I am happy that I have to visit doctors less, but I also don't always see the need of appointments"
"I sometimes rely on my other resources for information cause I found them reliable before"
"I have my networks....well established"
"My partner is very supportive of my condition.....so self management doesn't feel that straining anymore"
"Consultations with my doctors have same pattern as Ion as I stay in the range....I am good"
"HCPs may not be confident at times but I think I know my body now a bit better and know how to handle"
"I eventually figure out which when facing new things.....by relying on others when HCPs are not accessible"
"I get really excited when better tools like closed loop system first was introduced there is so much potential to make my life easy!!!"
"I don't have to explain everything from scratch– they remember me, and that builds trust."
"Burnout used to scare me... now it's something I can talk about and get support for."
"I used to feel like I was chasing control. Now I feel like I'm in control. maybe not full sometime some life events still cause disruptions"
"They helped me fine-tune my loop setup with me, not for me."
questions like about menstruation to my internsist....cause he is a guy"
"I am not able to ask questions about my sex life infront of my parents to my internist"
"I do not get to discuss my problems in the 10 minute consults as most time goes into discussing the peaks which are out of time in range"
"There is just so many changes in my life currently...do I have to also manage my T1D on my own?"
"I don't understand how to navigate the insurance and coverage....it was so easy before"
"My parents & doctors want me to think about long term effects when managing T1D but for me right now it is more about just getting through"
"I just see my doctor thrice a year for only 10 mins and I am not able to discuss much as most time is spent dicussing the report and time in range"
"I don't feel prepared like I used to before...and apparently so many things can affect T1D.....I would honestly like some anticipatory guidance"
"I found my own ways of getting information through different mediums like the associations and podcasts cause it is shared by experienced patients but I have my doubts."
"I sometimes get to know about treatments and options through peers than the HCP's thus it makes me sus about hospitals and insurance. Like they are not completely honest with me."
"If I have to ask about few things for example how to carry pump while air travel and what precautionary measures to take while traveling.....I have wait till the opening hours for calling or send an email...or I ask in my network of associations"
"I sometimes chatgpt my questions it's easier but I am not sure if I can trust the information but it is atleast concise, immediate"
"I like that a tertiary hospital like radboud is helping me manage my condition but I feel the care is fragmented and receative where as I would like it to me more proactive"
"I don't sometimes see pint of yearly meetings with my internist....it is same thing everytime...therefore I dont always follow appointments"
CGM, pumps, and
ignored
ach or follow-up
"bad numbers" go
ling because care isn't
on to safe, supportive
No in-between space for shared responsibility (teens/ parents)
Patients hide issues out of fear of being blamed
Teen-specific emotional struggles dismissed
Reactive vs. proactive care
Mental health and burnout rarely integrated into regular care
Overreliance on patients to "prove failure" to access tools
Appointments too short to address life changes or emotional shifts
Patients feel like isolated decision-makers, carrying full cognitive load
Community and informal support not formally recognized or supported
HCPs sometimes dismiss lived experience or DIY expertise
2025 | Kalyani Chopade

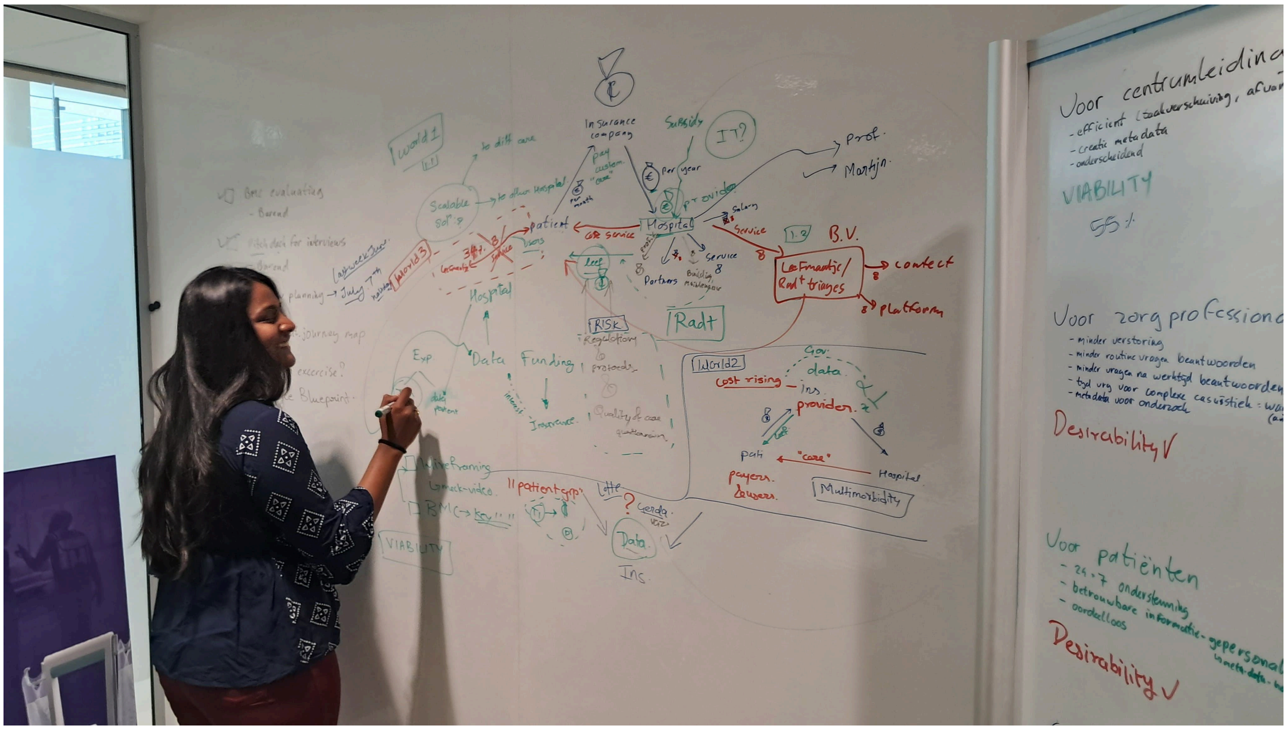
E Mapping Sessions @HIL

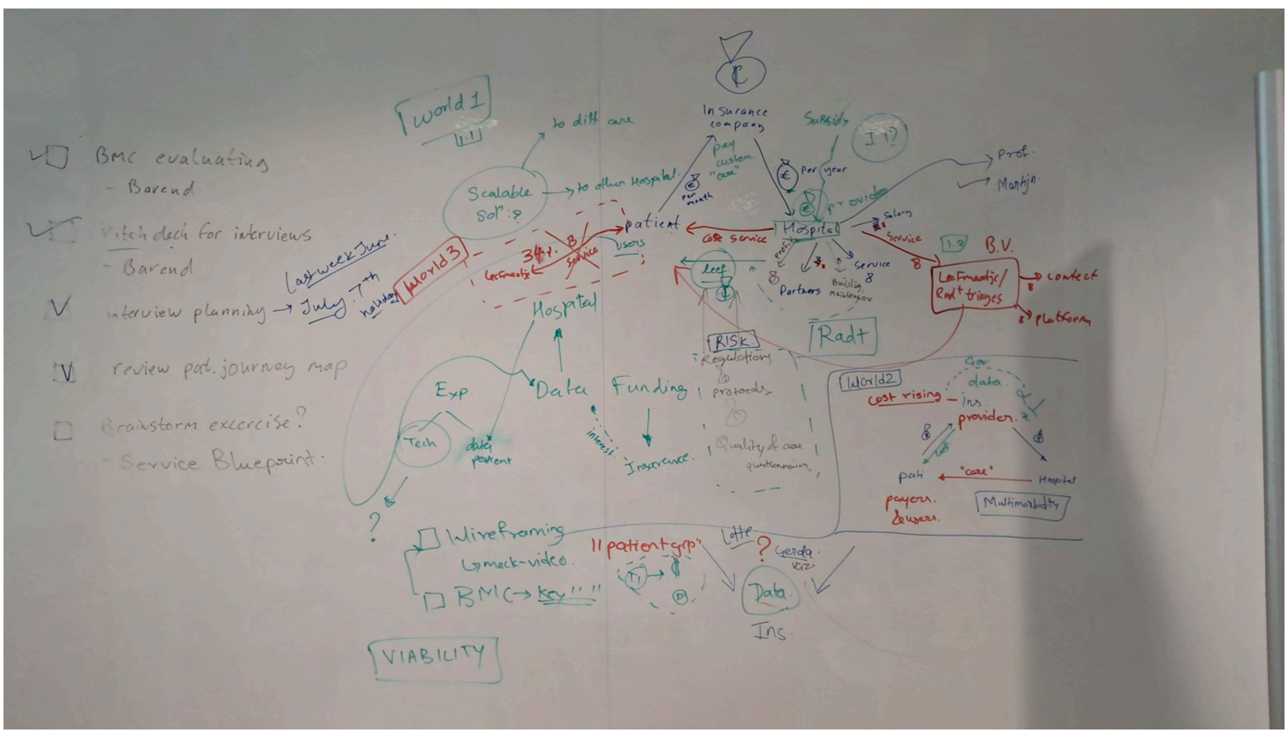




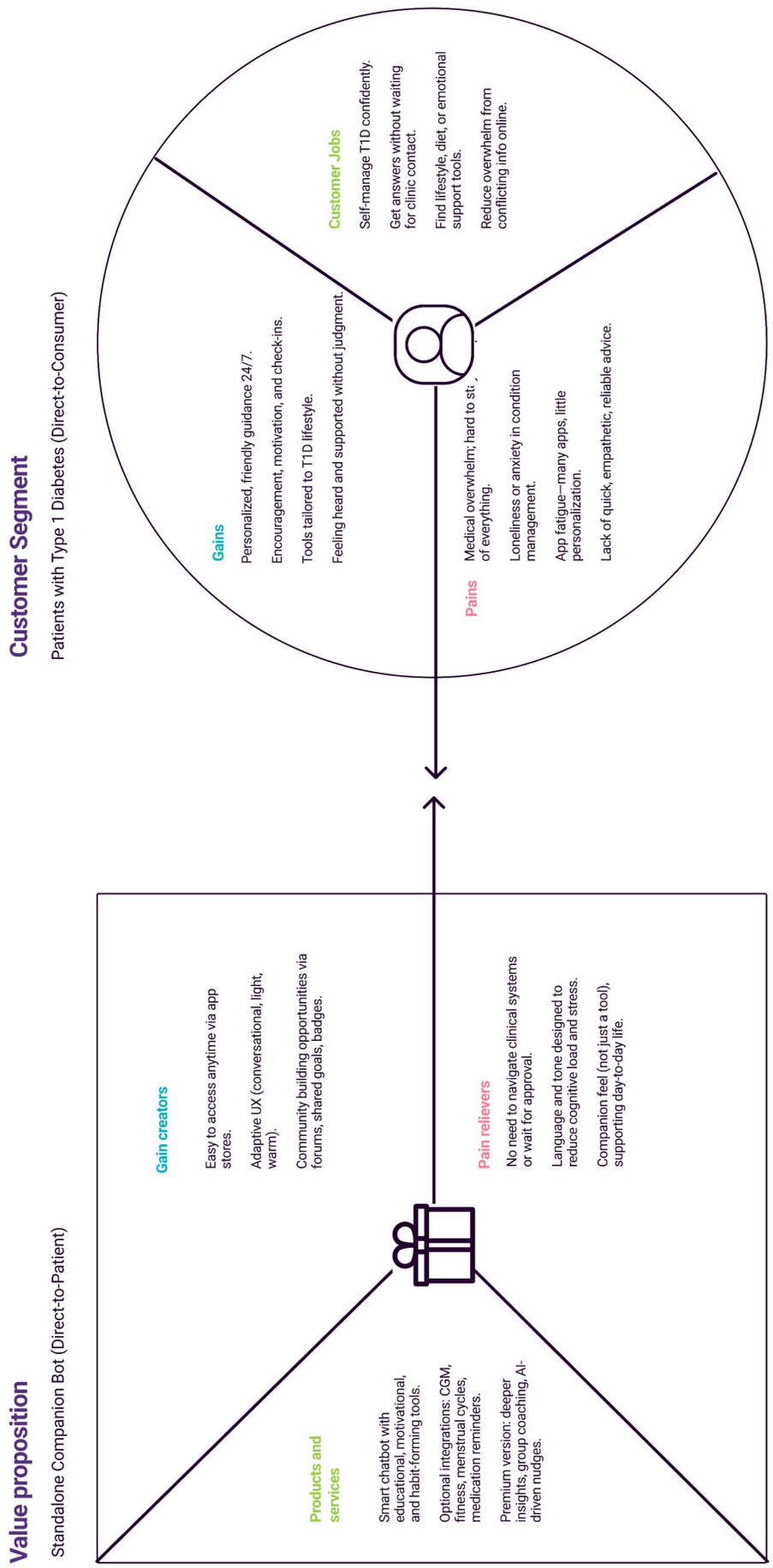





Voor centrumleiding
VIABILITY
Voor zorg professionals
Desirability
Voor patiënten
Desirability


BMC evaluating
- Barend
Pitch deck for interviews
- Barend
interview planning → July 7th
review pat. journey map
Brainstorm excercise?
- Service Blueprint
World 1
Insurance company
Subsidy
Scalable Sol
patient
Hospital
World 3
Prof.
B.V.
contact
platform
Radt
RISK
Regulations
World2
cost rising
providers
Exp.
Tech
Data
Funding
Insurance
Multimorbidity
Wireframing
mock-video
BMC
Ins
VIABILITY

F Value Proposition Canvases

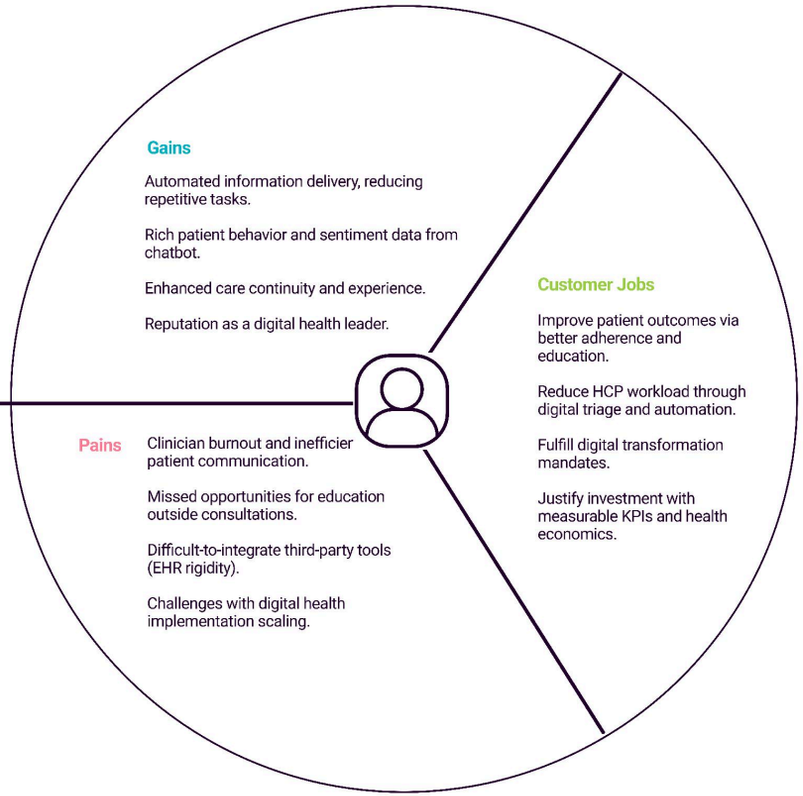


Value proposition

Hospital Integration (e.g., Radboud+)

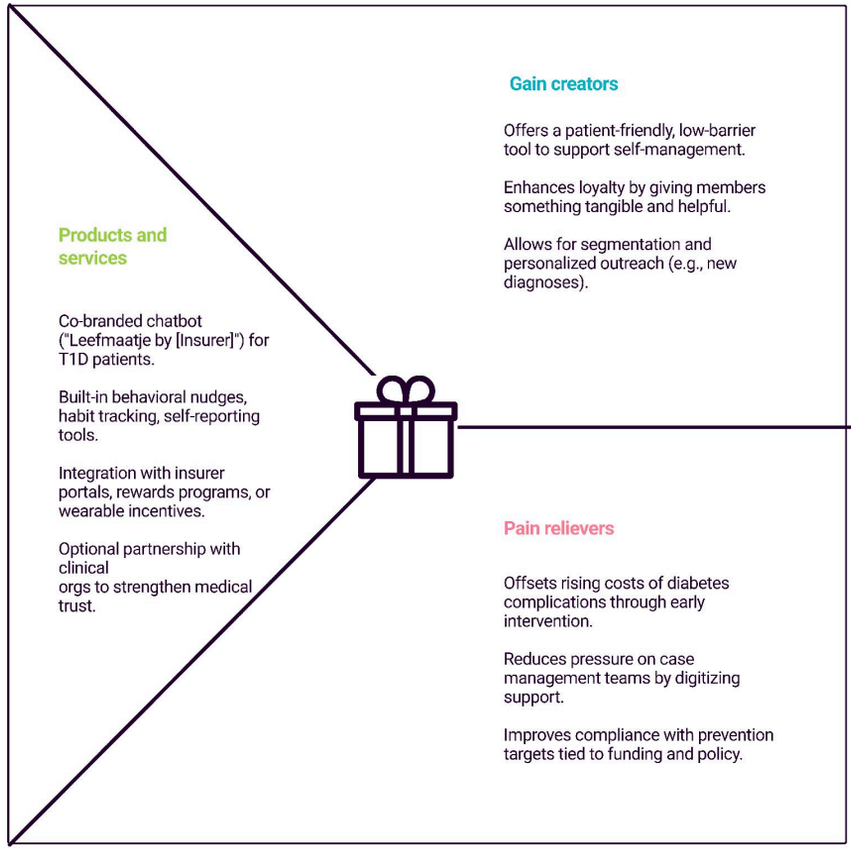
Customer Segment

Hospitals & Healthcare Providers



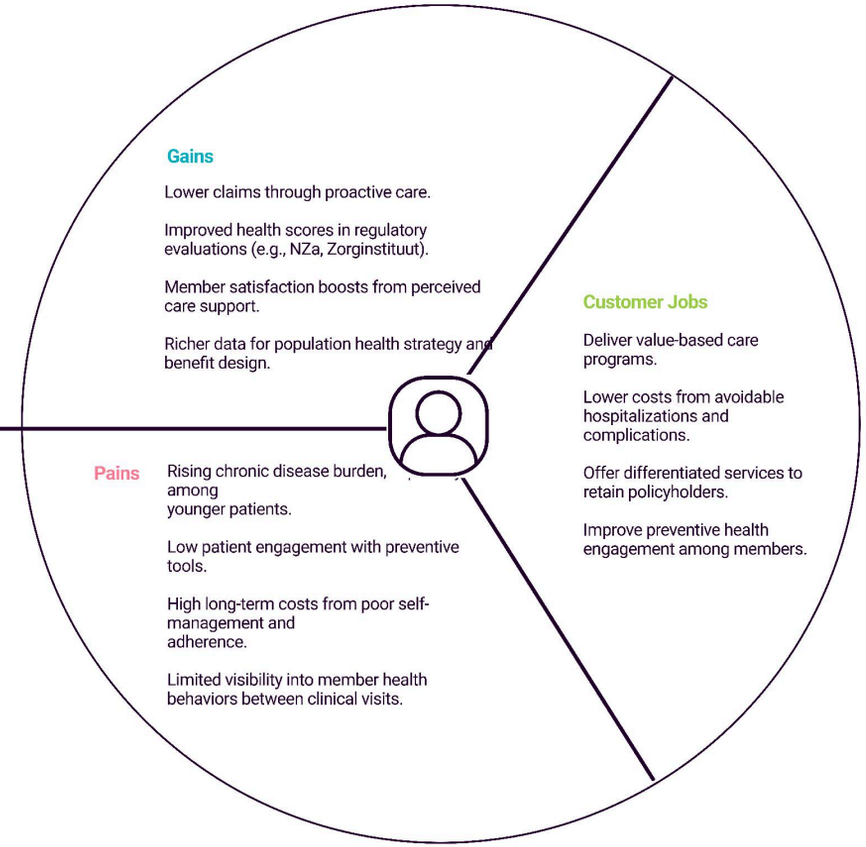
Value proposition

Leefmaatje as Insurer-Backed Lifestyle Companion



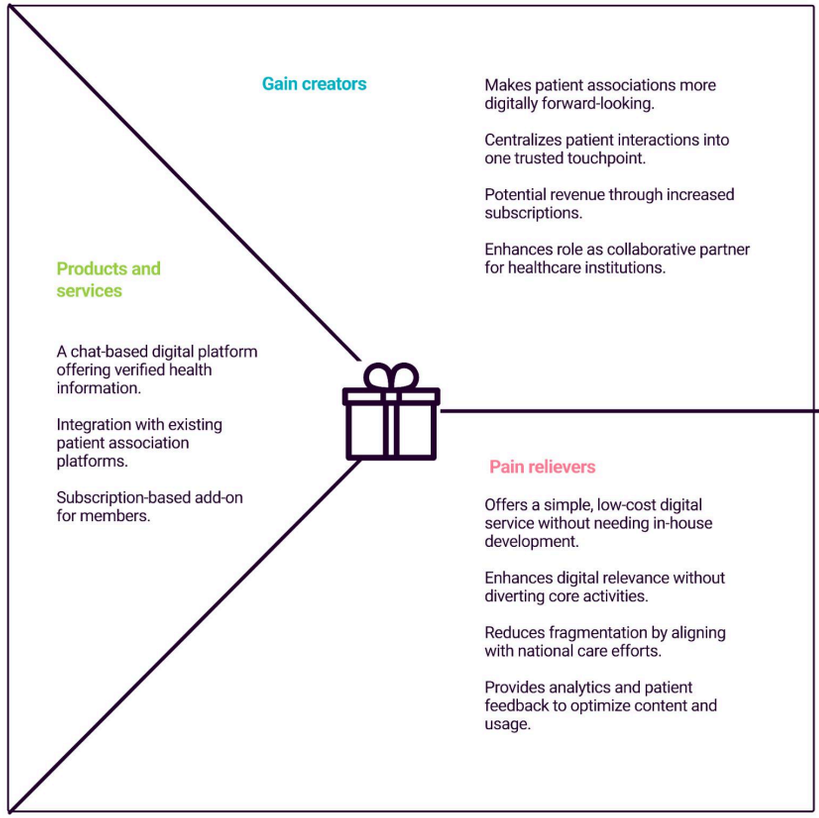
Customer Segment

Health Insurance Providers



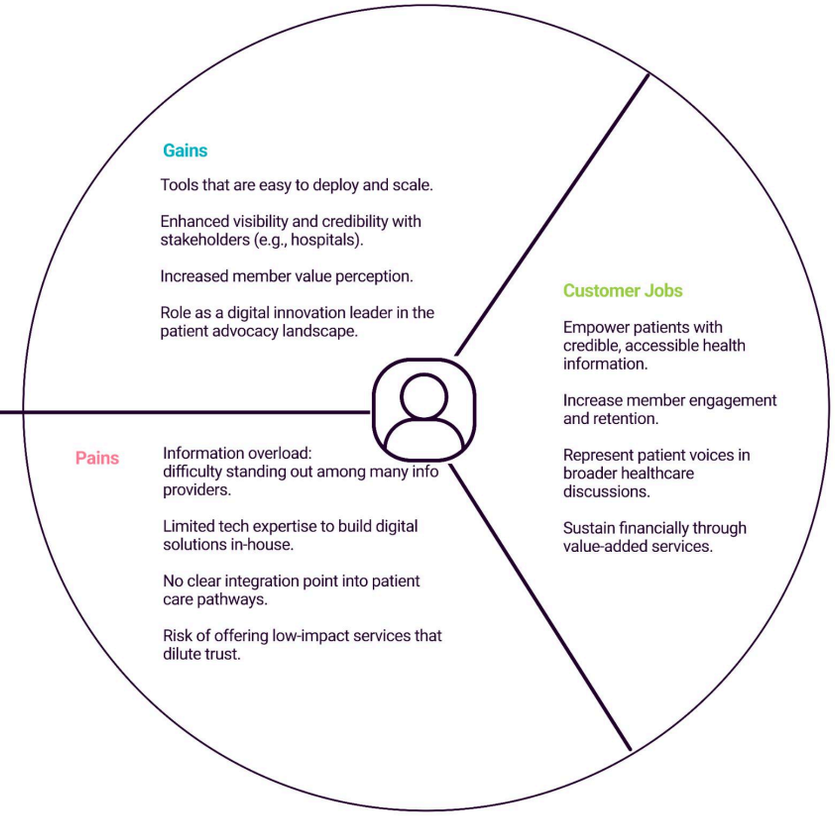
Value proposition

Patient Association Integrated - Leefmaatje



Customer Segment

T1D Patients subscribed to the Association.



G Design Fiction Stories

World 1

The Year is 2032: Diabetes Care Has Shifted

By 2032, managing chronic conditions like Type 1 Diabetes is no longer centered solely around hospital appointments or reactive care. It's become a continuous, collaborative partnership between patients and their care teams — enabled by intelligent, empathetic digital tools embedded in everyday life.

Hospitals as Hybrid Ecosystems

Hospitals now function more like collaborative hubs than isolated treatment sites. Care teams: endocrinologists, diabetes educators, nurses, psychologists; coordinate with AI-driven services that extend support beyond the clinic walls. Every patient has a digital companion tailored to their care plan, lifestyle, and other needs.

At Radboud the Chatbot Companion, Leefmaatje

The T1D support chatbot is no longer just a "tool." It's a trusted presence in the patient's daily life: checking glucose trends, translating food choices into insulin needs, and nudging them toward rest when burnout comes. But more importantly, it remembers what matters: Amira has her exams next week. Jonas is fasting for religious reasons. Lienis pregnant and her numbers are erratic.

A Two-Way Dialogue with Care Teams

Patients prepare for consultations with the chatbot. They review what's changed, reflect on what they want to ask, and even rehearse questions. The doctor receives a pre-consultation snapshot, summarizing not only blood sugar trends, but also emotional context and patient priorities.

Consultations are no longer dominated by "data download" they're focused, they're human.

Built-In Escalation & Personalization

When signs of risk emerge persistent hypos, emotional strain, skip check-ins; the chatbot gently flags them and offers the option to connect with the care team. Patients feel watched over, not watched. For hospitals and insurers, this means fewer emergency visits and better long-term outcomes. For patients, it means peace of mind, agency, and less burnout.

From Monitoring to Mentoring

In this world, patients are not passive recipients of care. They're co-pilots of their health journey — supported by a bot that educates, listens, and adapts. The healthcare system has embraced this role not just as a convenience, but as a reallocation of clinical energy: letting human professionals focus where they're needed most, and letting digital agents handle the rest.

The World of 2032: Intelligent, Integrated Care

In 2032, chronic illness care has fundamentally shifted. The burden of diseases like Type 1 Diabetes, hypertension, and depression no longer falls solely on overworked clinics and overwhelmed patients. Instead, care has become distributed, data-driven, and deeply personal.

National health policies across Europe now mandate digital support companions for chronic care. These AI-enabled services are regionally adapted, governed in public-private consortia between hospitals, insurers, patient organizations, and AI developers. What began as experimental pilots are now standard entitlements — bundled into insurance policies and embedded in patient portals.

For T1D patients like Amira, life with diabetes no longer means fragmented care, stacks of handwritten logs, or 30-minute consultations that never quite get to the point. Her SmartCare Assistant, nicknamed “Leefmaatje,” lives quietly on her phone — part chatbot, part health librarian, part emotional coach.

It:

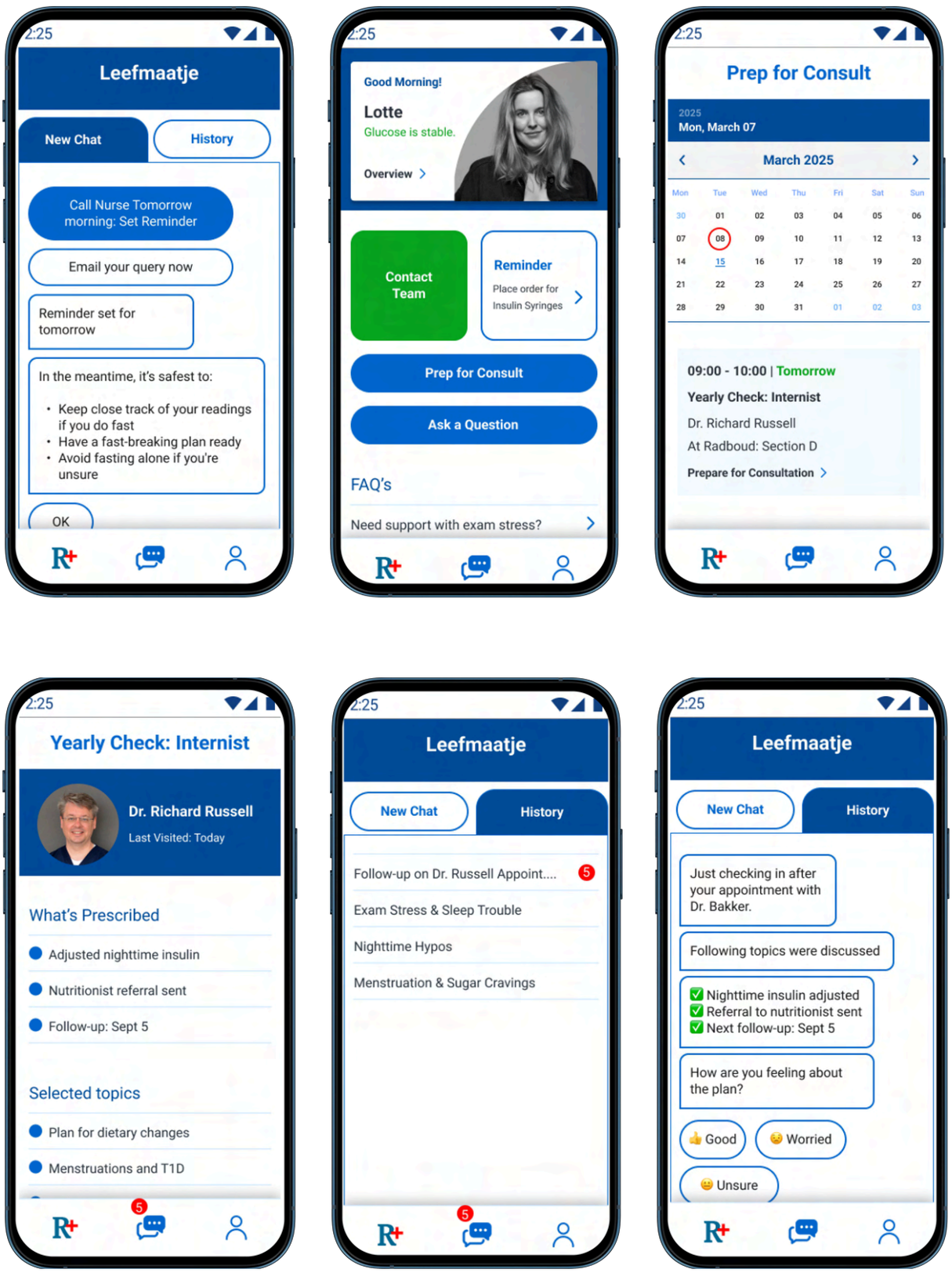
- Translates blood sugar curves into advice she can act on
- Flags side effects of new meds, considering her comorbid asthma
- Prepares her for specialist appointments by summarizing her last month
- Connects her with a nurse when something feels off

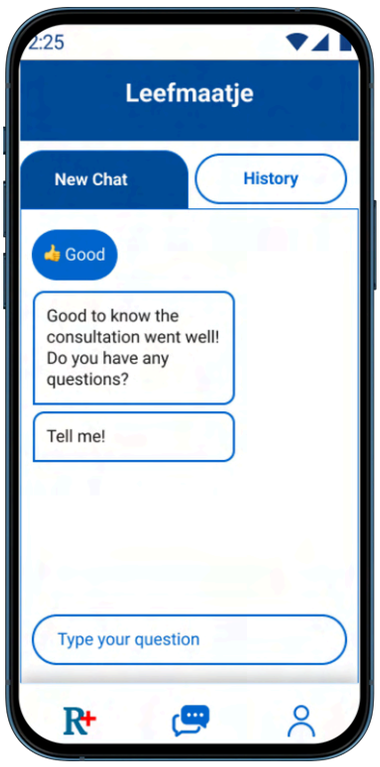
Hospitals appreciate Leefmaatje presence: their data dashboards show which patients need real support, not just those who complain loudest. Consults are more focused. Nurses spend less time educating, more time treating. The chatbot even automates documentation prep.

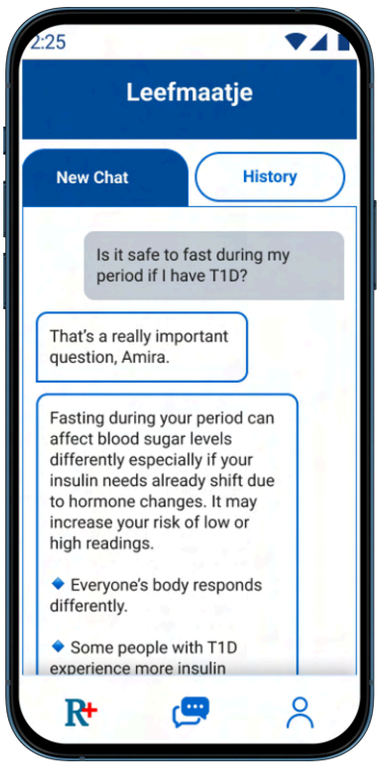
Insurers, once cautious, now rely on these bots to reduce unnecessary care, prevent complications, and even guide patients to underused services they've already paid for — like nutritionists or peer groups. AI-driven risk stratification means high-risk patients get extra nudges, while stable ones feel independent and supported.

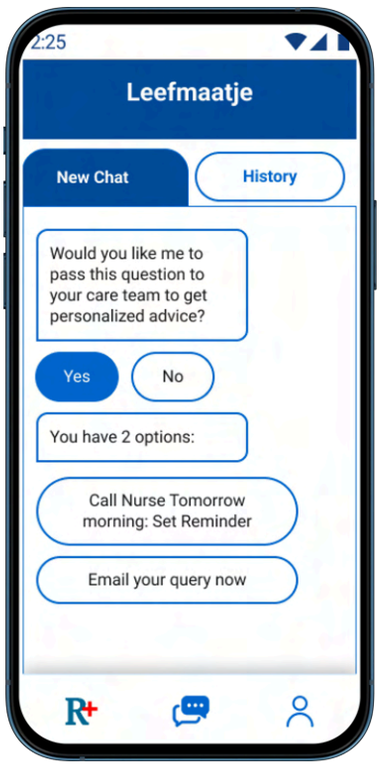
For millions, the chatbot has become an invisible infrastructure — an ally that whispers not just what to do next, but why, in a world where healthcare is finally catching up to complexity.

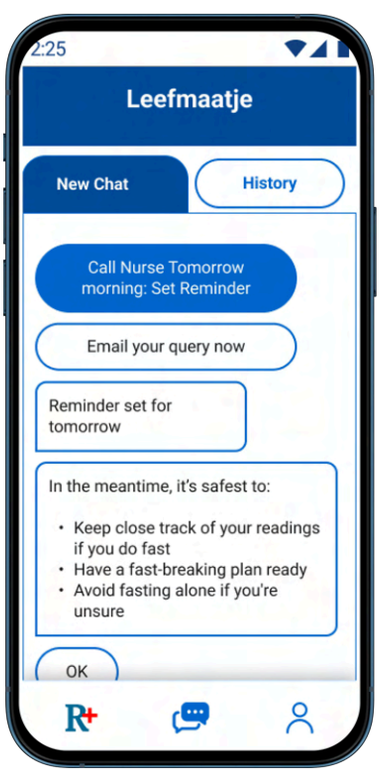
H Provo-types




2:25
Leefmaatje
New Chat
History
Good
Good to know the consultation went well! Do you have any questions?
Tell me!
Type your question


2:25
Leefmaatje
New Chat
History
Is it safe to fast during my period if I have T1D?
That's a really important question, Amira.
Fasting during your period can affect blood sugar levels differently especially if your insulin needs already shift due to hormone changes. It may increase your risk of low or high readings.
Everyone's body responds differently.
Some people with T1D experience more insulin


2:25
Leefmaatje
New Chat
History
Would you like me to pass this question to your care team to get personalized advice?
Yes
No
You have 2 options:
Call Nurse Tomorrow morning: Set Reminder
Email your query now


2:25
Leefmaatje
New Chat
History
Call Nurse Tomorrow morning: Set Reminder
Email your query now
Reminder set for tomorrow
In the meantime, it's safest to:
Keep close track of your readings if you do fast
Have a fast-breaking plan ready
Avoid fasting alone if you're unsure
OK

Interview Guide_BMC Testing

- Greetings and short introductions if meeting for first time
- Consent Form mention
- Asking consent to record the session
- Mention the focus
- Ask for clarity on what's being presented
- Slides with the concept introduction , value propositioning, identified stakeholders needed with their roles

Post Presentation questions

- What are your initial thoughts on this concept? What concerns or doubts do you have about the concept?

- Do you think the value proposition,
- Is it enough for hospitals to implement?
- Does it meet the needs of you experience in work?
- Would you consider this solution a “nice-to-have” or a “must-have”? Why?

- Does the proposed concept have potential to solve your challenges effectively?

- The roles and activities described for Hospital, do you think they are doable?
- Your role in the in this project doable?
- Are there any concerns or blockers here that need to be addressed before initiation of the project?
- Do you fore see more roles and more stakeholders required for this service implementation?

- Is there anything you think I’ve overlooked?
- What features or functions beyond what are proposed would you expect or need in such a solution that may be missing?
- Would you be open to follow-up conversations or prototyping sessions?
- Do you have any suggestions for other stakeholders we should speak with?